TECHNOLOGY DEPT.

Gas Journal

VOL 275. 105TH YEAR. LONDON, JULY 15, 1953. NO. 4702. PRICE 1/3

SMITH **UNIVERSAL DOMESTIC METER**

ALL REPAIRS can be carried out by the use of simple engineering tools.

NO SPECIALIZED LABOUR or equipment necessary for servicing.

The design, incorporating UNIT CONSTRUCTION, provides easy replacement of all parts.

PUBLIC LIBRARY AUG 3 1953 DETROIT

NO HEAVY EXPENDITURE for replacement of corroded cases is incurred.

Outstanding in design, robust in construction, the Smith Universal Domestic Meter presents a new standard in accuracy and reliability. Backed by the priceless experience of many years, it has been thoroughly tested and proved.

Draining plugs can be fitted if required.

ALL PARTS INTERCHANGEABLE —no selective assembly is necessary.

SMITH METERS *DOMESTIC AND INDUSTRIAL*

SMITH METERS LTD. 186 Kennington Park Rd., London, S.E.11. Phone: RELiance 2447-8-9. Grams: Smieters, Lamb, London
Works: Kennington, S.E.11 and Streatham Vale, S.W.16. Northern Sales Office: 3-4 East Parade, Leeds, 1. Phone: 23726

ALL ROUND SATISFACTION

MAINLAYING

UNTOUCHED PHOTOGRAPH OF TYPICAL PRESSURE RECORDING CHART AS RETURNED FROM ONE OF OUR MANY HIGH PRESSURE MAINLAYING CONTRACTS. CONSISTENTLY GOOD WORK IS A FEATURE OF "U.K." SERVICE TO THE GAS INDUSTRY.

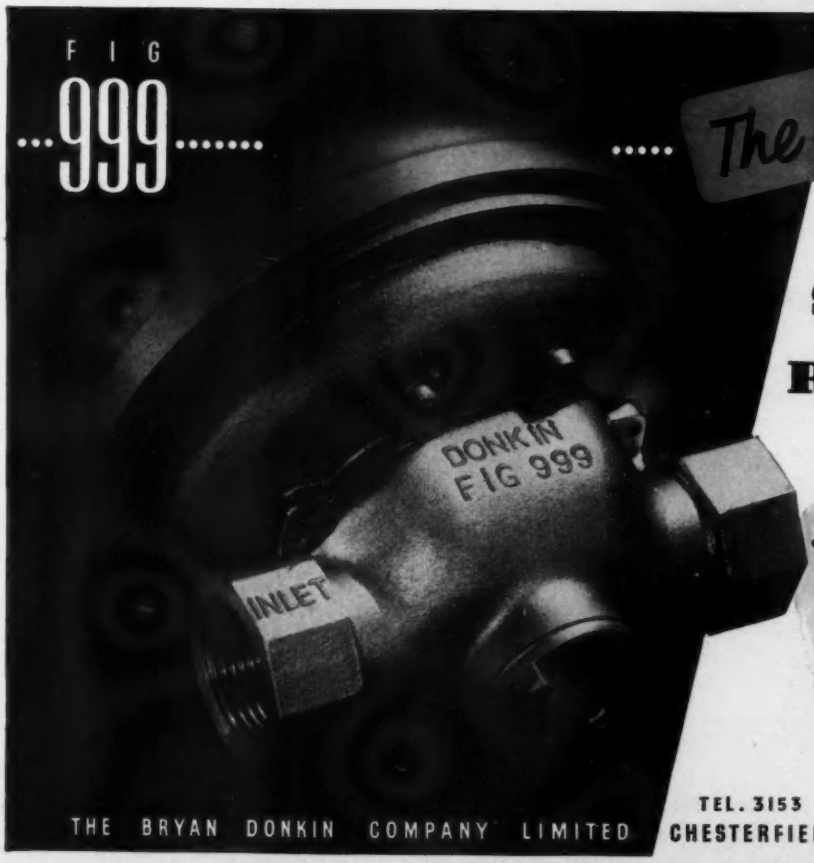
CONSTRUCTION ENGINEERING CO. LTD. U.K.

UNITED KINGDOM CONSTRUCTION
AND ENGINEERING COMPANY LTD.,
CIVIL ENGINEERING CONTRACTORS
HAMMOND ROAD, KIRKBY INDUSTRIAL ESTATE, LIVERPOOL
TELEPHONE, SIMONSWOOD 2601 (3 LINES)

FIG 999

The LATEST

Low Pressure
SERVICE
REGULATOR



WRITE FOR FULL SPECIFICATION

THE BRYAN DONKIN COMPANY LIMITED

TEL. 3153
CHESTERFIELD · LONDON · MANCHESTER

A STORY OF DEVELOPMENT

THE EVOLUTION OF THE Spersom MAIN COCK

1901

At the Coronation of King Edward VII the "Spersom" Main Cock was 24 years old.

1911

Now ten years older the design is practically the same except for the contour of the Thumb Plug Fan.

1937

Great advancement has been made and the "Spersom" Main Cock has now self-lubrication and self-adjustment for wear.

1953

The new "Spersom" Main Cock has lubrication reservoirs and self-adjustment for life long service without attention.

Spersom TRADE MARK

SPERRYN & COMPANY LIMITED.,
MOORSOM STREET . BIRMINGHAM, 6.
TELEPHONE: ASTON CROSS 4011 (5 lines)
LONDON ADDRESS: 21-23, GT. SUFFOLK ST. S.E. 1
TELEPHONE: WATERLOO 6418.

G for GOOD GAS METERS

G for GEORGE

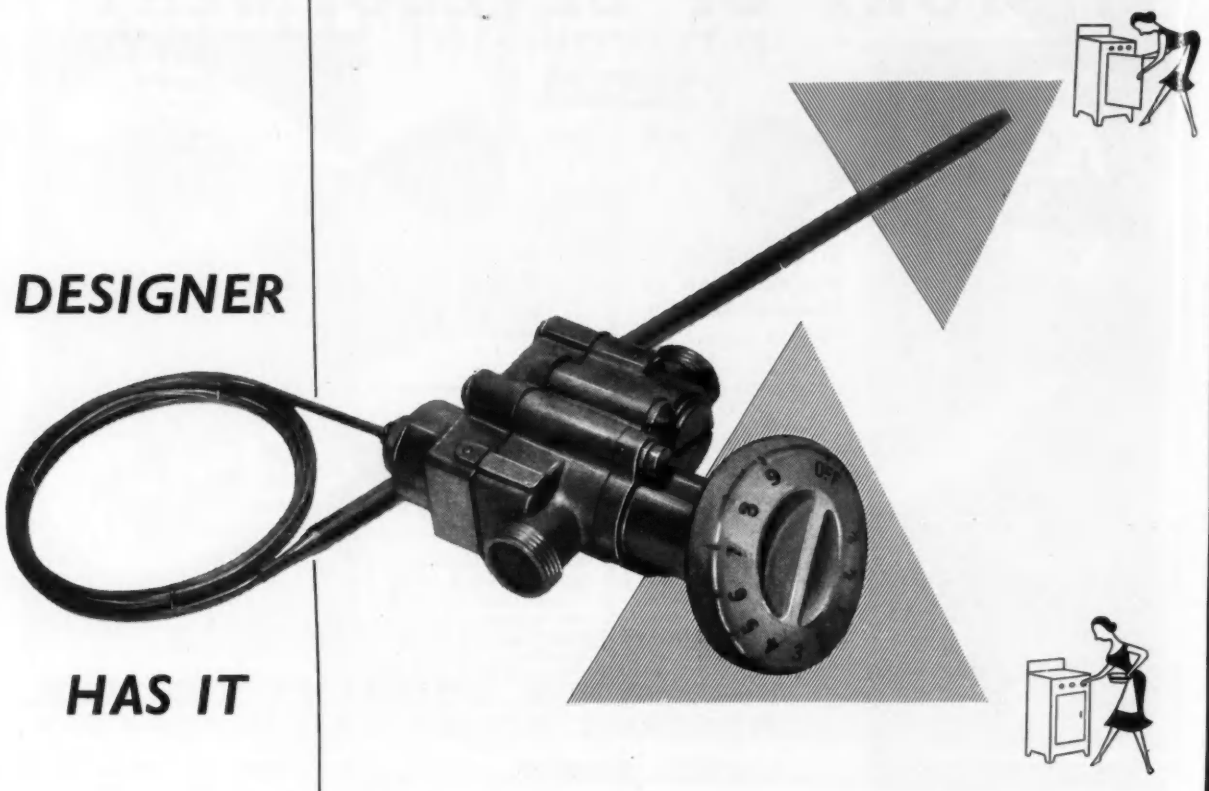
G for GLOVER

Product of Radiation Ltd

GAS METERS

GEORGE GLOVER & CO. LTD
123 KINGS RD. CHELSEA, LONDON S.W.3
BRANCH WORKS :-
WARRINGTON, LEEDS
MANCHESTER, CARDIFF

DESIGNER HAS IT BOTH WAYS



With this Teddington capillary type thermostatic control the designer has complete freedom to place the element where it will respond best to variations in temperature, and the main body of the instrument where it will look best and is most conveniently got at. This Teddington control, available with or without oven cock incorporated in the one compact unit, is in use in De La Rue (B6 and G5), Raymond, and Cannon (A125) cookers. Write for full details.

Teddington CAPILLARY TYPE GAS COOKER THERMOSTAT

THE BRITISH THERMOSTAT COMPANY LIMITED
THE LARGEST PRODUCERS OF AUTOMATIC CONTROLS IN EUROPE
Sunbury-on-Thames, Middlesex. Sunbury-on-Thames 456

HOT GAS DETARRING—AN AID TO LIQUOR DISPOSAL

An announcement by Whessoe Limited

The most convenient method of disposal of gasworks liquor may often be in admixture with domestic sewage.

Dr. Key (Gas Works Effluents and Ammonia, I.G.E., 1938) suggested that the non-volatile organic constituents, the so called "higher tar acids" (H.T.A.), were particularly undesirable as they were, with the exception of catechol, extremely resistant to biological oxidation. Also, they were strongly colour forming on atmospheric oxidation and were thought to be the cause of foaming tendencies in the sewage plant; they would often increase the oxygen absorption of the final sewage effluent.

It is generally accepted that liquor from continuous vertical retort plants contains a relatively high proportion of the H.T.A. and their removal from such liquor makes it more readily acceptable to the sewage authority. Removal of the monohydric phenols is not generally necessary as they are readily oxidised in the first stage of the biological oxidation process, but if recovery is desired it can be achieved by a simple solvent process using a cheap reagent. The H.T.A. on the other hand require expensive reagents which are subject to hydrolysis or solution losses in proportion to the bulk of liquor treated.

Principle of Hot Gas Detarring

Fortunately, it is possible to keep the general works liquor substantially free from H.T.A. by removing the suspended tar from the vertical retort gas before it passes to the primary condensers. This is because the H.T.A. are not volatile in steam and condense with the tar. They remain dissolved in the tar unless contact with the aqueous condensate takes place at a later stage in the cooling process. Early removal of the tar avoids this contact.

The electro-detarrer is the only effective method of removing the tar and the practice of installing detarrers before the primary condensers is known as hot gas detarring. The liquor condensed after a hot gas detarrer contains more monohydric phenols as there is no tar present to absorb these constituents.

In some cases, the residual oil fog content leaving the condensers is considered low enough for satisfactory working of the gas purification plant, but in others a second stage electro detarrer is installed to deal with it.

The theory of hot gas detarring has been discussed recently by Dr. Blackburn and co-workers (G.R.B. Comm. 63) who showed that the H.T.A. constituents to be avoided are not so much the polyhydric phenols as the "humic" and carboxylic acids associated with them. The principle is not affected since these substances are included in the non-volatile portion of the organic substances present.

Contribution of Hot Gas Detarring to Disposal Problem

Hot gas detarring is not a complete solution of the disposal problem as the deconcentration bleed from the retort house circulating system and the purifier drainings have to be disposed of separately. It is, however, a simple and inexpensive aid to disposal. Its value is not lost when complete dephenolation is required since the main bulk of liquor can be treated for monohydric phenol recovery at increased yield, by one of the usual processes, whilst only the small deconcentration bleed remains to be treated by the more expensive process for the removal of the H.T.A. It can be regarded in fact as a most economical method of concentrating the H.T.A. leading to important economies in capital and running costs of plant for polyhydric phenol recovery.

W. W-D. hot gas detarrers installed or on order include those at Manchester, Southport, Hinckley (1 and 11), Wellington, Redditch, Malvern, Birmingham and Smethwick.

WHESSOE LIMITED
DARLINGTON & LONDON

STAND 141 GROUND FLOOR GRAND HALL ENGINEERING, MARINE & WELDING EXHIBITION, OLYMPIA SEPTEMBER, 3-17.

What OXYGEN Hand Cutting can do—

Making...

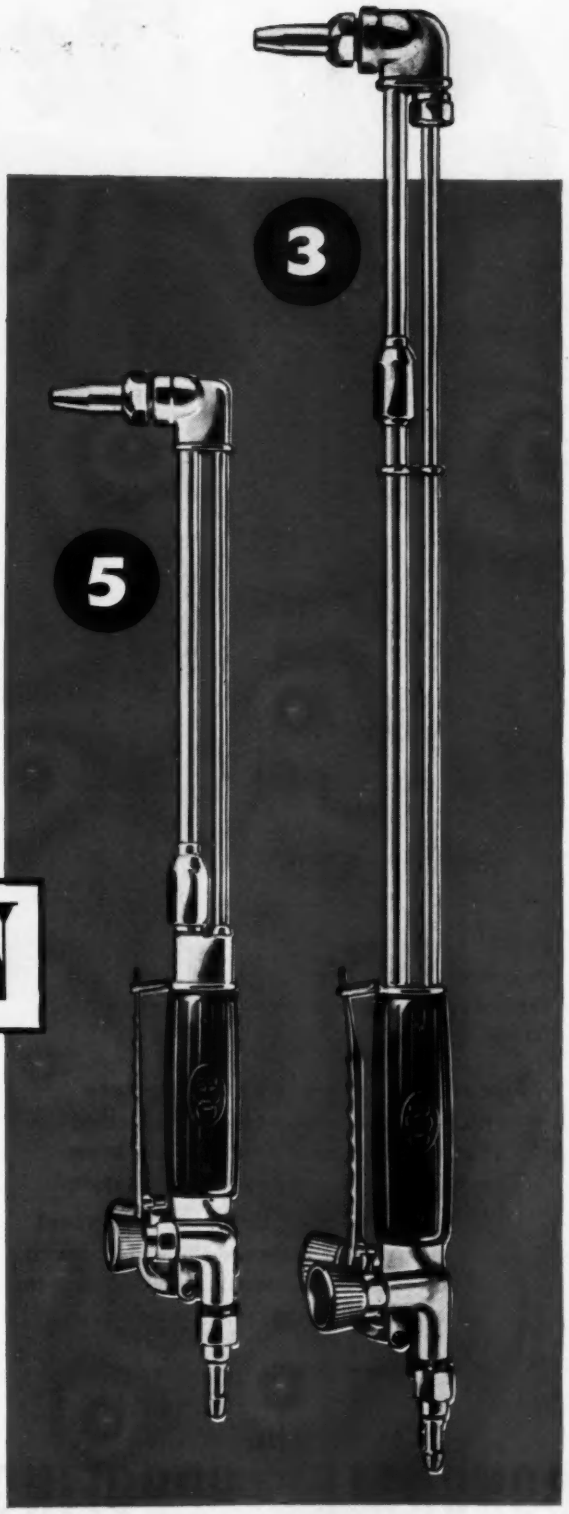
The Cutogen Blowpipe is now universally used for rapid cutting of iron and steel in a great many applications. These include shaping heavy plates for engine frames, bed plates, etc., profiling heavy sections for use in place of expensive forgings, for girder cutting, gouging and weld removal. It is an accepted tool for all constructional cutting. The clean, accurate cuts achieved make for easier fabrication.

Breaking...

The capacity and versatility of the Cutogen hand cutter makes it indispensable on all scrap cutting and breaking operations—such as the breaking-up of 10" thick armour plate on H.M.S. Warspite shown here.

BOC DESIGNED AND MADE PERFECT B

—and the B·O·C EQUIPMENT to do it!



Cutogen 5

1 A robust Cutter. Cuts 12 ins. mild steel and 4 in. cast iron.
2 Quick-action ball ended valves with large size control knobs.
3 Lever cutting control "off" when released.
4 Valve body and nozzle head from hot brass stampings. Nozzle head internally threaded.
5 Anti-spatter nozzles.
6 Positive colour identification and non-interchangeable threads for gas connections.

STANDARD MODELS
18" with 90° HEAD 24" with 75° HEAD (18" model also available)
Also available to order with longer shanks in increments of 6 ins. Chromium plated—not for eye appeal—but for sound service. The smooth, hard-plated surfaces are spatter free.

CUTOGEN

With their accurate one-piece nozzle and finger-tip control of fuel gas and oxygen, Cutogen Blowpipes are the lightest, strongest and easiest-to-use of all oxygen cutters. Wherever there's iron or steel to be cut—remember CUTOGEN.

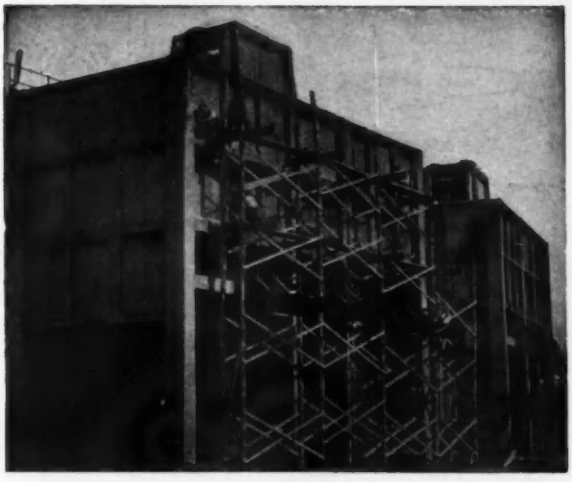
Cutogen 3

Similar specifications to Cutogen 5 but of larger capacity to handle the heaviest hand cutting work.
Standard length 27 ins. between centre lines of cutting nozzle and control valves. Obtainable in greater shank lengths by increments of 6 ins.
Top tube is stainless steel to give rigidity to the increased shank length necessary for comfortable operation.
Cuts 20 ins. mild steel
Cuts 15 ins. cast iron
Other Cutogen Blowpipes are available as follows:—
Cutogen 6 for Powder Cutting
Cutogen 7 for Powder Washing
Cutogen 8 for Deseaming

Write for full particulars to your B.O.C. Branch

THE BRITISH OXYGEN CO LTD LONDON & BRANCHES

Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

Handbook "GUNITE" sent on request

THE CONCRETE PROOFING CO., LTD.

100, VICTORIA STREET, S.W.1

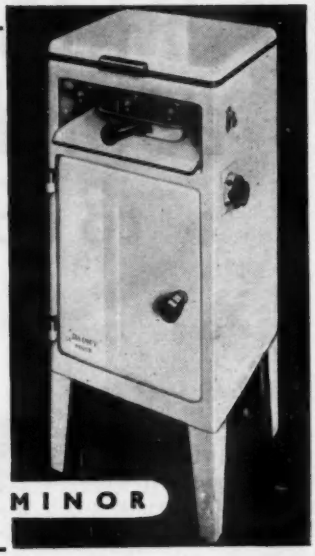
Telephone: Victoria 7877 & 6275

BIG Capacity for LITTLE Kitchens

Especially suited to the kitchens of flats and small houses, this highly efficient cooker provides utmost cooking capacity in the least possible space. Cast iron construction ensures strength and durability and reduces maintenance costs to a minimum, thus making the Dainty Minor particularly suitable for simple hire or hire purchase.

Approved and adopted by leading gas boards

The **Dainty** MINOR



R. RUSSELL & SONS, LTD., DERBY

Agents for Scotland and Northern Ireland:

JAMES R. THOMSON & CO. LTD., 41, YORK STREET, GLASGOW, C.2

Keep your factory *CLEAN*

WITH THE *Secomak*

MODEL 51 INDUSTRIAL VACUUM CLEANER

- *Twin motors, Universal AC/DC, 1200 watts.*
- *Dust Bag Capacity 1½ Cu. ft.*
- *Weight only 110 lbs.*
- *Quick fitting adapter instantly converts machine to high velocity blower-hot or cold air.*

Speed, economy and ease of handling are star points with this exceptionally powerful Industrial Vacuum Cleaner. It will rid your factory of money-wasting dust, dirt and swarf—and do it cheaply and quickly.

Light weight, compact design, and pneumatic-tyred wheels ensure effortless "one-man" handling even in confined spaces. The large capacity dust bag can be removed and replaced in a few seconds.

Approved by Factory Inspectors.

Write for Data Sheet 511/50/GJ

SERVICE ELECTRIC CO., LTD.,

SECOMAK WORKS, HONEYPOT LANE, STANMORE, MIDDLESEX.

Telephone: EDGware 5566-7-8-9.

DISHED ENDS ?

OUT of the furnace and into the press goes the partially finished end . . . up comes the powerful press ring to form the required flange . . . and another Dished and Flanged End is ready.

Furnace and press capacity is available at Harvey's Greenwich works for the pressing of both light and heavy Dished and Flanged Ends. Diameters range from 6' to 9' 0", edges can be prepared for either welding or riveting. Manufacturers providing their own metal can obtain prompt delivery of ends to specification. For details and tables showing dimensions available, send for List GJ 790.

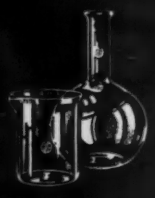
Harvey

G. A. Harvey & Co. (London) Ltd. Woolwich Road, London, S.E.7

'PYREX'

Regd. Trade Mark BRAND

Laboratory and Scientific Glassware



AN IMPORTANT ANNOUNCEMENT

FACTORY extensions and increased production facilities have made it possible to reduce the "each" price of most lines of our 'PYREX' Brand Scientific Apparatus. In addition, advantage may now be taken of a generous discount if purchasing in quantities of a dozen or more.

Your normal trade supplier will gladly furnish you with all particulars, together with a copy of our new and more comprehensive Catalogue, on request. Prompt delivery is a special feature of our improved service.

Please note that 'PYREX' Brand Laboratory and Scientific Glassware listed in our Catalogue is made only by James A. Jobling & Co. Ltd., Wear Glass Works, Sunderland, to whom you are asked to write in case of any difficulty of supply.

TWO EXAMPLES OF OUR NEW PRICE RANGE:

Example 1.

No. 2500. Flat Bottom Flask 250ml. with B24 "*GRIP SEAL*" interchangeable ground Socket. Price each, 6/-: Per doz. 64/10 6 doz. or over, per doz. 60/-

Previous price, each 6/8

Example 2.

No. 3200. Measuring Cylinder, 100ml. Price each, 7/8 Per doz. 82/10 6 doz. or over, per doz. 76/8

Previous price, each 8/4

Special Apparatus

We can fabricate glassware to your own design, made to serve your specific purpose, and we welcome your enquiries.

MADE IN PYREX ENGLAND REGD TRADE MARK

JAMES A. JOBLING & CO. LTD.

Wear Glass Works Sunderland

The original and only makers of 'PYREX' Brand Glass in the United Kingdom

MADE IN PYREX ENGLAND REGD TRADE MARK

A FAMILIAR SCENE —A FAMILIAR NAME

FOR MAINLAYING

CONSULT WILLIAM PRESS & SON LIMITED

40 YEARS' SERVICE TO THE GAS INDUSTRY

WILLIAM PRESS & SON LTD. INDUSTRIAL PIPEWORK

22, QUEEN ANNE'S GATE, WESTMINSTER, S.W.1.
Telephone: WHitehall 1752-3 & 2961. Telegrams: Unwater, Parl, London.
WILLOUGHBY LANE, TOTTENHAM, N.17.
Telephone: TOTtenham 8171-6. Telegrams: Unwater, Southtot, London.

PROTECTION

IN Chemical Works, Gas Works, Refrigerating plants, etc., the necessity for dealing with gas escapes and repair work calls for efficient protection of the men on the job. This is provided, in low concentrations of gas, by the "PURETHA" Respirator, which is comfortable, efficient and simple. Its canisters are coloured according to the gas or group of gases against which they give protection. Full mask and mouth-piece, nose-clip and goggles types.

For protection in confined spaces and high concentrations of gas, the company's well-known types of oxygen and compressed air self contained Breathing Apparatus are available. All other protective devices for the worker are also manufactured and supplied: Smoke helmets, short distance fresh air apparatus, resuscitating apparatus, dust masks, protective clothing, goggles, etc.

DIVING APPARATUS, BREATHING APPARATUS OF ALL TYPES, RESUSCITATING APPARATUS AND ALL INDUSTRIAL SAFETY APPLIANCES

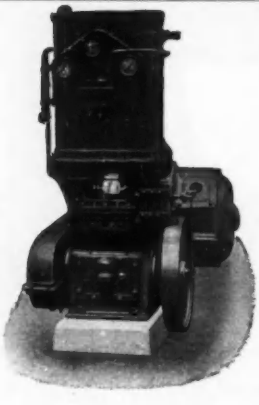
Telephone: Elmbridge 5900

SIEBE GORMAN & CO. LTD. LONDON

EVERYTHING FOR SAFETY EVERYWHERE

Telegrams: Siebe, Surbiton

TOLWORTH, SURBITON, SURREY

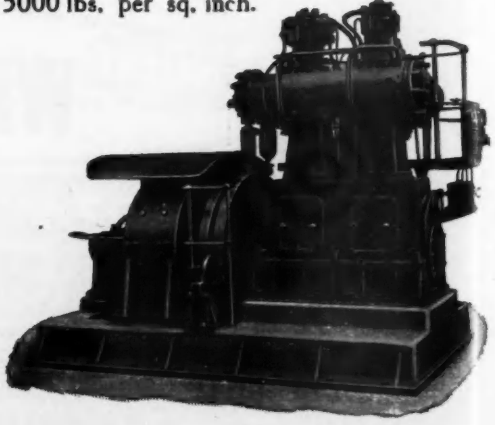


HIGH PRESSURE GAS COMPRESSORS *for*

pressures up to 5,000 lbs. per sq. in.

The illustrations show two high pressure gas compressors which we made recently to order. As specialists in the design and manufacture of compressors for both air and gases, we make compressors for a wide range of capacity and pressure up to 5000 lbs. per sq. inch.

The compressor shown above has a capacity of 25 cu. ft. of free hydrogen per minute compressed to 3000 lbs./sq. inch. The illustration on the right shows a four-stage compressor with a delivered capacity of 200 cu. ft. of free town's gas per minute compressed to 5000 lbs. per sq. inch.



For full information regarding gas compressors, write, giving particulars of the duty required, to—

REAVELL & CO., LTD.

RANELAGH WORKS, IPSWICH

Telegrams: "REAVELL, IPSWICH." Phone Nos. 2124 & 2125

HOWDEN

CENTICELL

The 'Centicell' has a very high efficiency in dust removal, without any considerable loss of sensible heat.

It reduces slagging of producer-gas nostrils and combustion chamber silica work, and eliminates much of the heavy maintenance cost of flue cleaning.

JAMES HOWDEN & CO. LTD.
195 Scotland Street, Glasgow, C.5.
15 Grosvenor Place, London, S.W.1.

WEATHERILL HYDRAULIC

THREE SCOOP SIZES
¾, 1 & 1¼ cu. yds.
LIFTING CAPACITY ONE TON
ACCESSORIES
CRANE ATTACHMENT
BULL/ANGLE DOZER BLADES

● Here is the mechanical shovel that really has a large appetite for hard work. It will prove indispensable in Coal and Coke Yards where continuous production demands a reliable method of mechanical loading, conveying and discharging. Easily manoeuvreable within limited space, it will quickly load, lift and convey, and discharge at any height up to 11′ 0″, but requires only 7′ 0″ headroom. Ruggedly built for rough work and maximum penetration, the Weatherill Hydraulic is designed to give outstanding performance at fingertip effort.

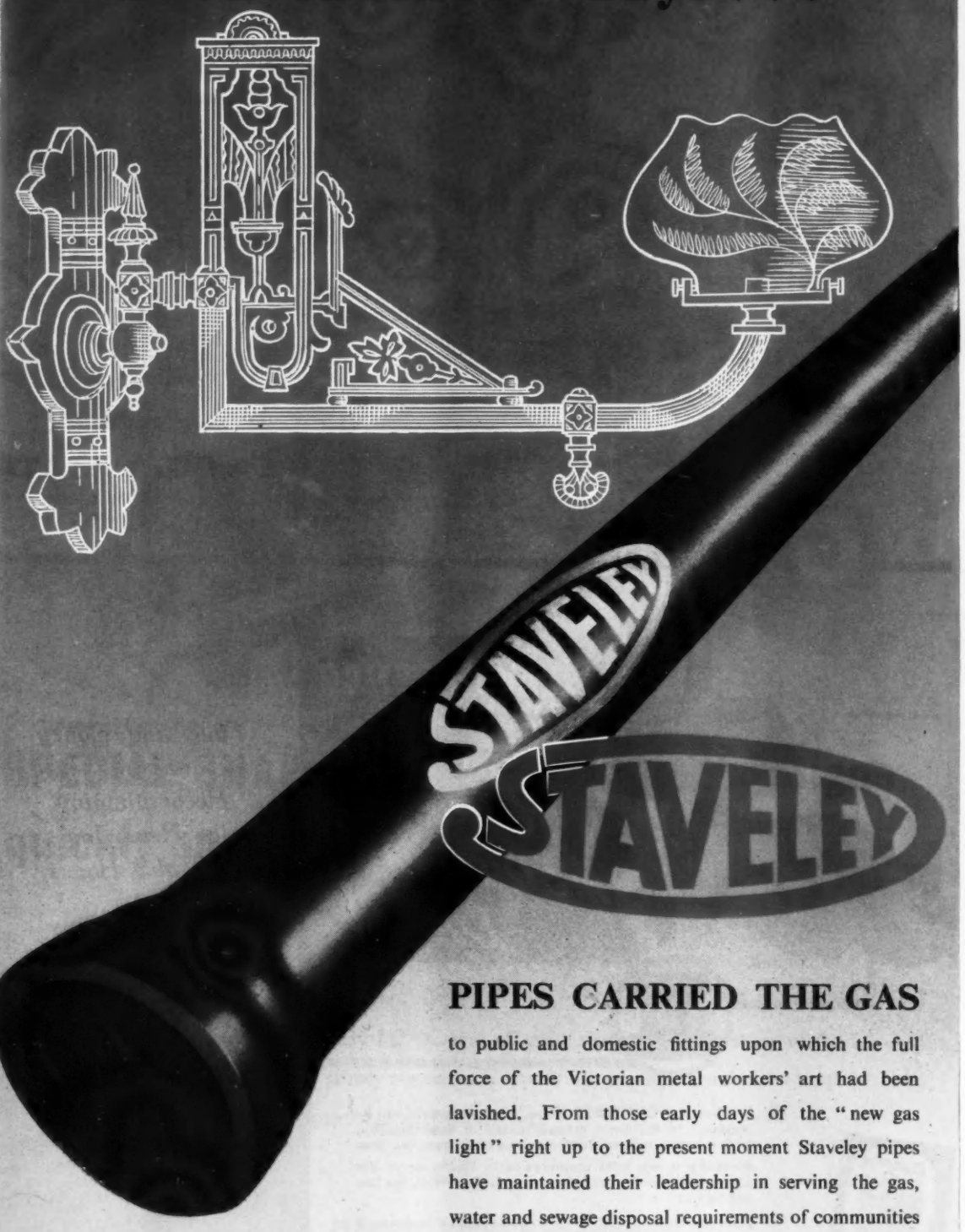
NOTE THESE FEATURES— Totally hydraulic for positive power · Dozer scoop clears front wheels · Controlled tipping of scoop · Automatic tongue release · Scoop retracted and locked instantly · Will excavate below ground level · Low centre of gravity for stability · Driver comfort · All round vision · Cab detachable.

Full details on request

Phone: TOTtenham 4707-8-9
Grams: Weatherhyd, Southtot, London
Cables: Weatherhyd, London

F. E. WEATHERILL LTD
UNION ROW · LONDON · N·17

Even in those days . . .



PIPES CARRIED THE GAS

to public and domestic fittings upon which the full force of the Victorian metal workers' art had been lavished. From those early days of the "new gas light" right up to the present moment Staveley pipes have maintained their leadership in serving the gas, water and sewage disposal requirements of communities at home and abroad.

THE STAVELEY IRON & CHEMICAL CO. LTD. NR. CHESTERFIELD

Flanged Fittings

Good solid British quality, more than ever in demand today, has always been given by Kirk's. For Flanged Fittings, Flanges, Steam Mains, Coils, Fabricated Pipework, Valves, etc., you are safe if you go to Kirk's, whose good name has been built on the quality and reliability of their work.

K . . . the heart of reliability

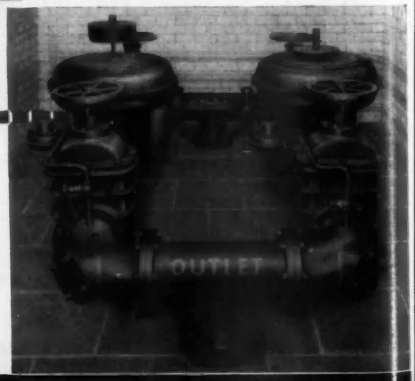
Trade Mark

KIRK & CO. (TUBES) LTD.

74/82 PARADISE ST · LONDON · S.E.16. BERMONDSEY 3156/7/8

also at WALSALL, MANCHESTER AND PONTYCLUN

Time and money saved in the Reconditioning or Replacing of Valve Bowls



★ **See how the COMPLETE Valve Bowl Assembly can be removed to facilitate reconditioning or interchanging with a spare unit without disconnecting from the line.**

Normally to suit inlet pressures up to 30-lbs. sq. in. (or higher if desired); outlet pressure inches W.G. (or lbs. per sq. in.).

Send for Brochure 47/8/BV or Complete Catalogue if desired.

● *Steel kiosks also supplied*

JEAVONS ENGINEERING CO · TIPTON · STAFFS

'PHONE: TIPTON 2161 (5 Lines). PROPS: E. E. JEAVONS & CO. LTD. 'GRAMS: PIPELINES TIPTON

A few of the patterns now in use.

(The sectional firebrick is patented.) *Photograph by courtesy of Messrs. Fyreside Ltd.*

SPECIAL SHAPES of all sizes and designs quickly made in REFRACTORY CONCRETE

Instead of waiting weeks (and even months) for delivery of specially shaped firebricks, many Engineers cast their own in Refractory Concrete (composed of Ciment Fondu and crushed firebrick).

Refractory Concrete is ready for use and of great strength and hardness in 24 hours, can be cast to any shape, requires no pre-firing, is stable under load up to 1,300°C. and has no appreciable after-contraction.

CIMENT FONDU
Regd. Trade Mark
ALUMINOUS CEMENT

Please write for further details and literature.

LAFARGE ALUMINOUS CEMENT COMPANY LIMITED, 73, BROOK STREET, LONDON, W.1. Telephone: MAYfair 8546

3-1135

EXHAUSTERS

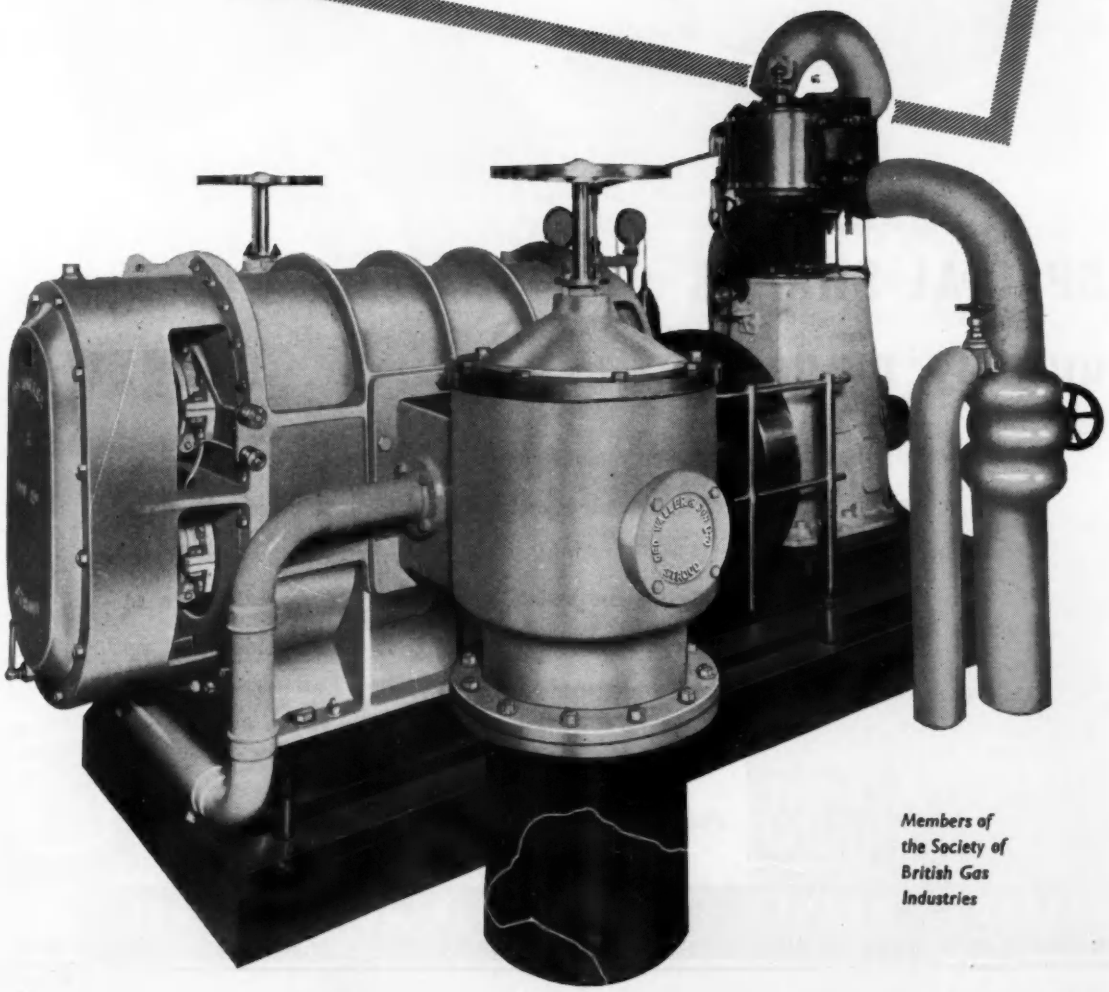
Roots Type

Capacities up to One Million cubic feet per hour

GEORGE **WALLER** AND SON LTD

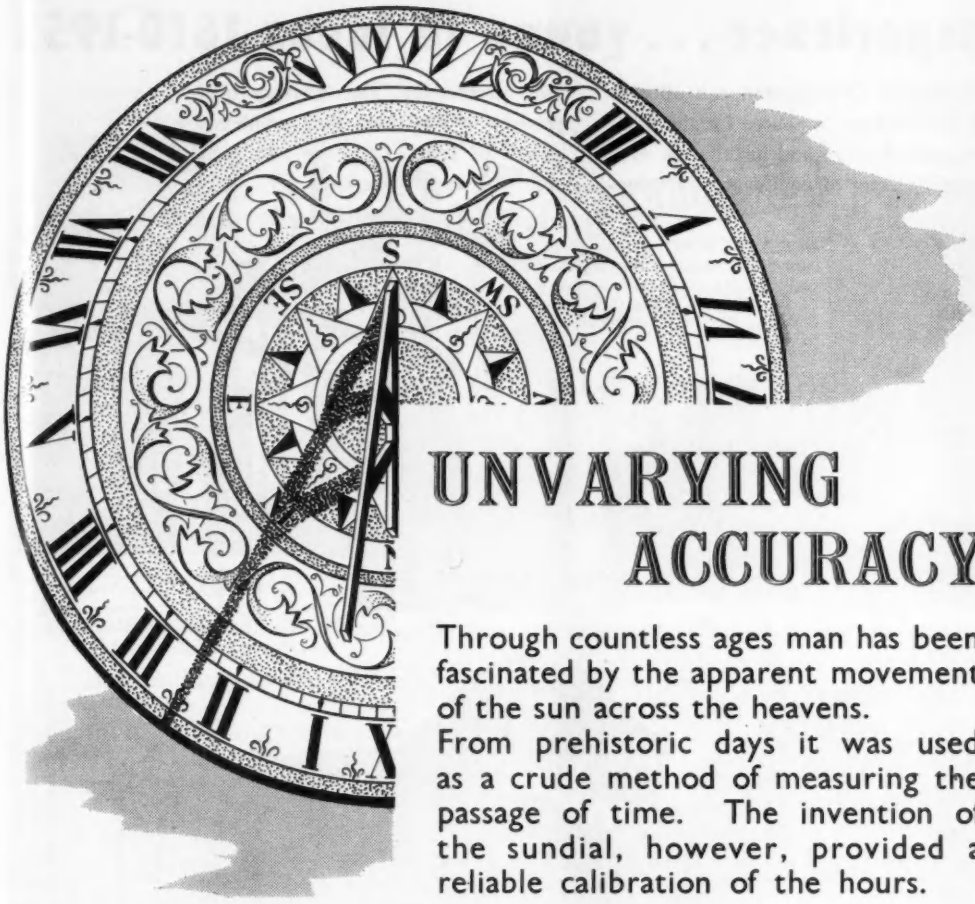
PHOENIX IRON WORKS · STROUD · GLOS

Telephone BRIMSCOMBE 2301/2



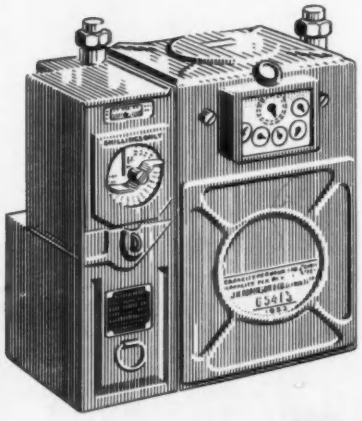
Members of the Society of British Gas Industries

12409.



UNVARYING ACCURACY

Through countless ages man has been fascinated by the apparent movement of the sun across the heavens.
From prehistoric days it was used as a crude method of measuring the passage of time. The invention of the sundial, however, provided a reliable calibration of the hours.



Measuring instruments of far greater accuracy are required under today's conditions.
Fine craftsmanship and modern manufacturing methods make the ROBINSON GAS METER a household word in the gas industry.

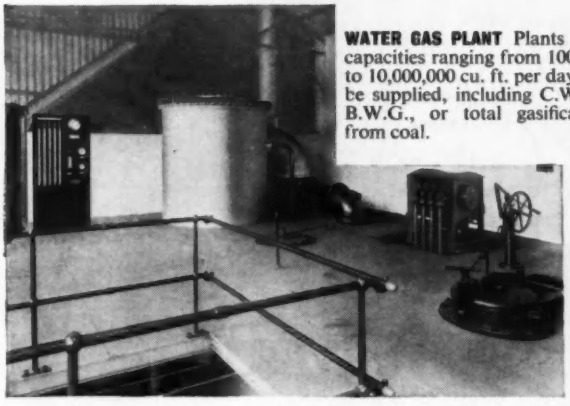
ROBINSON METERS AND ALLIED APPARATUS

J. H. ROBINSON & CO. (LIVERPOOL) **LTD.**
Head Office: **MILL LANE, OLD SWAN, LIVERPOOL, 13**
Sales Office: **85, MOSLEY STREET, MANCHESTER, 2**
Office and Works for Scotland: **3-5, NICOLL PLACE, EDINBURGH, 6**

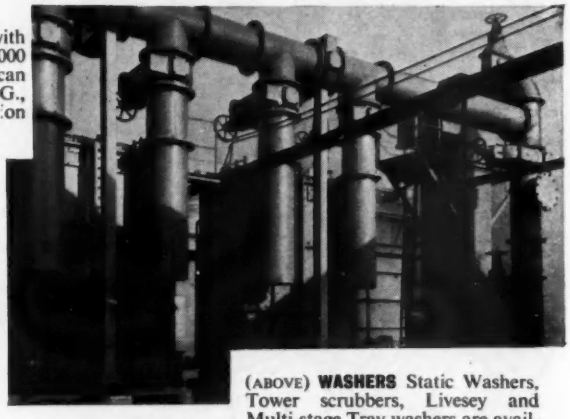
Manufacturers of the
AINTREE 393 WATER HEATER

Old in experience . . . young in ideas 1810-1953

The Balfour Organisation can offer to the Gas Industry a source for the planning, manufacture and installation of a complete range of equipment. Production, purification, the recovery of by-products — whatever the problem, a wealth of past experience and present ability is at your service.



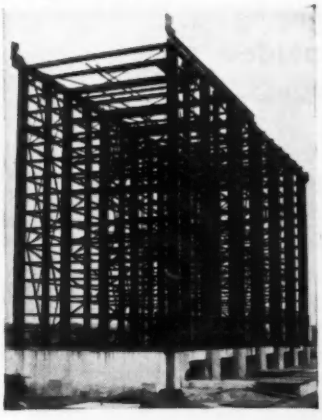
WATER GAS PLANT Plants with capacities ranging from 100,000 to 10,000,000 cu. ft. per day can be supplied, including C.W.G., B.W.G., or total gasification from coal.



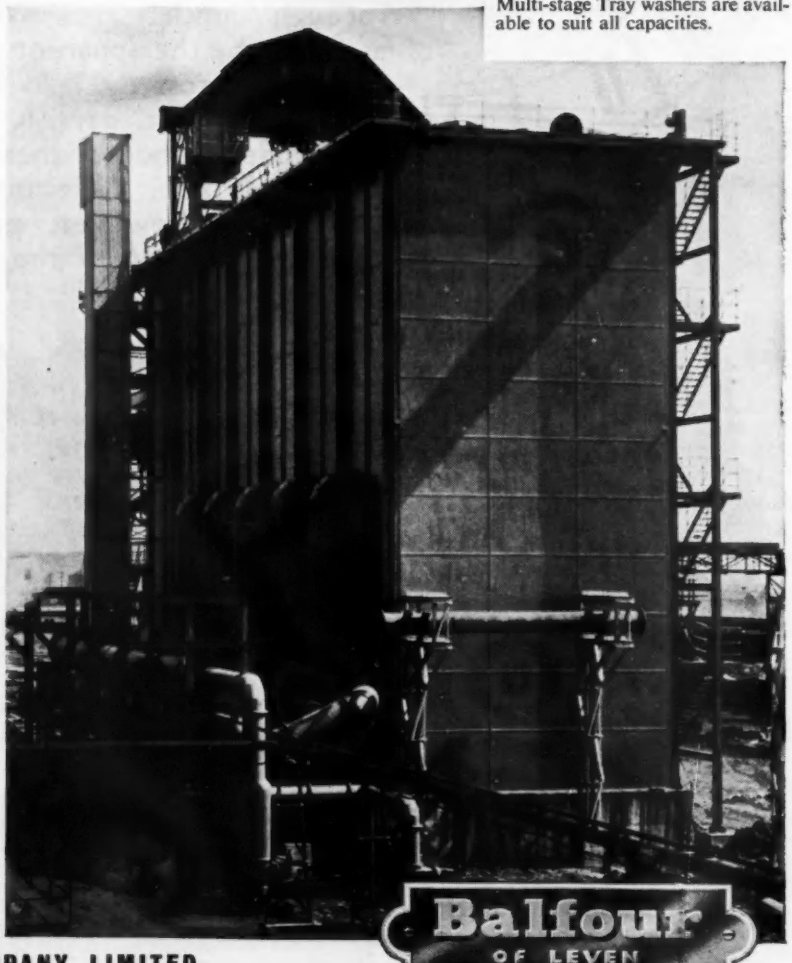
(ABOVE) **WASHERS** Static Washers, Tower scrubbers, Livesey and Multi-stage Tray washers are available to suit all capacities.

BALFOUR-LECOCQ TOWER BOX PURIFIERS

(BELOW) An early stage of erection of the plant at the Southall Works of the North Thames Gas Board. Capacity 7,500,000 cubic feet per day. (*Photograph by courtesy of the North Thames Gas Board*).



(RIGHT) The first installation put into operation at the Car House Works, Rotherham at the East Midlands Gas Board. Capacity 10,000,000 cubic feet of gas per day. To be extended to 20,000,000 cubic feet per day. (*Photograph by courtesy of the East Midlands Gas Board*).

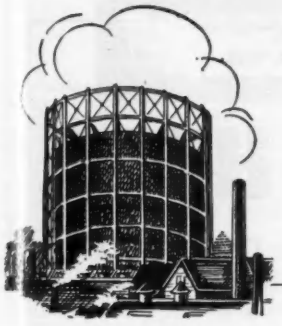


ALSO: Gasholders (*Spiral or Frame Guided, Rivetted or Welded*). Purifiers (*Cast Iron or Mild Steel*). Condensers (*Vertical Multipass-Horizontal Tubed and Supervertical*). Electro-Detarrers. Complete Gas treatment Streams. By-product Plant etc.

HENRY BALFOUR & COMPANY LIMITED

Artillery House, Westminster, London, and Durie Foundry, Leven, Fife

MEMBER OF THE BALFOUR GROUP OF COMPANIES

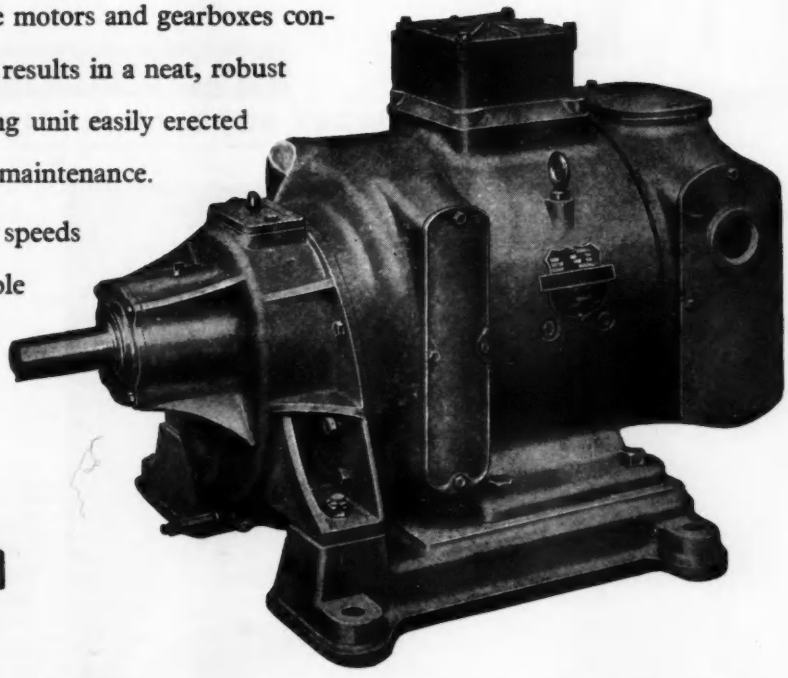


L.D.C. GASWORKS motors

The well-known range of L.D.C. "Gasworks" motors, specially designed and developed to meet the arduous conditions prevailing in Gas Works and Chemical Works, is also available with combined gear boxes so that the slow speed driving shaft can be directly coupled to conveyors, ash plants, pumps, etc.

The combination of these motors and gearboxes containing precision gearing results in a neat, robust and utterly reliable driving unit easily erected and requiring negligible maintenance.

A wide range of final shaft speeds covers almost every possible requirement over a H.P. range of 1 to 75 h.p.



An L.D.C. 2 H.P., D.C. Geared Motor Unit. 1460/120 r.p.m.

LANCASHIRE CRYPTO

The Symbol of Power in Industry for over 50 years.

LANCASHIRE DYNAMO & CRYPTO LTD.

Trafford Park, Manchester. Acton Lane, Willesden, N.W.10.

Please note new London office address—

ST. STEPHEN'S HOUSE, VICTORIA EMBANKMENT, WESTMINSTER, S.W.1.

M/22

Designed to suit ALL COOKERS

Streamline

GAS LIGHTER

Prov. Pat.

PRICED TO SELL TO THOUSANDS!

Highly efficient, immediate action and pleasing design. Consists of a robust bakelite and metal assembly, comprising a fine gas jet, under push button control, coupled to a small battery operated heater element.

All metal parts are heavily chromium plated and the barrel is made of heavy gauge brass to give complete protection to the element.

Other features include a swivelling holster and exclusive safety devices which render the lighter completely foolproof yet thoroughly dependable in use.

Finally, the "Streamline" Gas Lighter sells at a price suitable to all pockets.

Send for sample lighter and full particulars

CONCENTRIC MANUFACTURING CO. LTD.

PRIORY ROAD, BIRMINGHAM 6, Phone EAST 1662-3

'EXPAMET' PRODUCTS

Expamet Expanded Steel and Aluminium
Flattened Expamet
BB Lathing
Exmet · Ribmet
Super-Ribmet
XPM Welded Fabric

MUCH can be done with Expanded Metal. Here, by way of example, is a picture of a Vibrator Screen Grading Plant for which Flattened "Expamet" Expanded Metal is used with outstanding success for screening. *

More than sixty years' experience suggest that Expanded Metal will prove equally satisfactory for work now engaging your attention.

* *Vibrator Screen Grading Plant for coal at Southwick, Sussex for Southern Wharves Ltd.*

Expanded Metal

The Expanded Metal Company Ltd.
Burwood House, Caxton Street, London, S.W.1. Telephone: ABBey 3933. Stranton Works, West Hartlepool. Telephone: Hartlepools 2194

ALSO AT:
ABERDEEN · BELFAST · BIRMINGHAM · CAMBRIDGE
CARDIFF · EXETER · GLASGOW · LEEDS · MANCHESTER

INDEX TO 'JOURNAL' ADVERTISERS

A

	PAGE
A.C.L. Machinery, Ltd.	
Abbott, Birks & Co., Ltd.	
Accurate Recording Instrument Co.	
Acme Wringers, Ltd.	
Aeron Co., Ltd.	
Aerograph Co., Ltd.	
Alder & Mackay, Ltd.	
Allan Taylor (Engineers) Ltd.,	
Asco Gas Water Heaters, Ltd.	Cover IV
Asco Gas Water Heaters, Ltd. (F.A. Neat)	
Ashmore, Benson, Pease & Co	
Ashworth, Thos., & Co., Ltd.	
Aspinall's (Paints), Ltd.	
Associated Lead Manufacturers, Ltd.	
Associated Lead Manufacturers, Ltd. (Rustodian)	
Atlas Preservative Co., Ltd.,	
Autocontrol Boilers Ltd.	
Automatic Telephone & Electric Co., Ltd.	
Automotive Products, Ltd.	
Averill, C. R. Ltd.	

B

Bale & Church, Ltd.	181
Balfour, Henry, & Co., Ltd.	138
Begraco Meters, Ltd.	
Benham & Sons, Ltd.	
Blakeley Firth, Sons & Co., Ltd.,	
Bolton's Superheater & Pipe Works, Ltd.	
Booth, John, & Sons (Bolton), Ltd.	
Bratt Colbran, Ltd.	
Bray, George, & Co., Ltd.	
Bray, W. E., & Co., Ltd.	
British Flint & Cerium Manufacturers, Ltd.	
British Gas Purifying Materials Co.	182
British Oxygen Co., Ltd.	124,125
British Rototherm Co., Ltd.	
British Thermostat Co., Ltd.	122
British Thomson Houston, Ltd.	
British Tyre and Rubber Co., Ltd.	
British Vacuum Cleaner & Engineering Co., Ltd.	
Broadbent, Thomas, & Sons, Ltd.	
Brockhouse Heater Co., Ltd.	
Broom & Wade, Ltd.	
Brown, J., & Co., Ltd.	
Bugden, Thos., & Co.	

C

Cambridge Instrument Co., Ltd.	
Cannon (Holdings), Ltd.	
Cementation Co., Ltd.	184
Chamberlain Industries, Ltd.	
Chemical Engineering Wiltons, Ltd.	177
Chemical & Insulating Co., Ltd.	
Cinema-Television, Ltd.	
Clapham Bros., Ltd.	
Clayton, Son & Co., Ltd.	
Clifford Engineering Co., Ltd.	
Cohen, George, Sons & Co., Ltd.	
Concentric Manufacturing Co., Ltd.,	140
Concrete Proofing Co., Ltd.	126
Cort, Robert, & Son, Ltd.	
Cox & Danks Ltd.	
Crane, Ltd.	
Crone & Taylor, Ltd.	174
Crosby & Co., Ltd.	
Crossley Bros.	
Curtis, A. L., & Co.	
Cutler, Samuel, & Sons, Ltd.	

D

Davenport Engineering Co., Ltd.	
Davey, Paxman & Co., Ltd.	
Dawe Instruments, Ltd.	
De la Rue, Thomas, & Co., Ltd. (Gas Group)	
Dempster, R. & J., Ltd.	
Dempster, Robert, & Sons, Ltd.	
Derbyshire Silica Firebrick Co., Ltd.	
Diaphragm & General Leather Co., Ltd.	
Dick, R. & J., Ltd.	
Donkin (The Bryan) Co., Ltd.	Cover II
Douglas, Robert M., (Contractors), Ltd.	178
Douglas, William, & Sons, Ltd.	176
Drakes, Ltd.	
Drew, H. B., Ltd.	
Dunlop & Ranken, Ltd.	
Dunlop Rubber Co., Ltd., (Gen. Rubber Goods Div.)	

E

Easiclene Porcelain Enamel Ltd.	
Edgar, William, & Son, Ltd.	
Econtrol, Ltd.	
Electroflo Meters Co., Ltd.	
Electrolux Ltd.,	
Elliott Bros. (London), Ltd.	
English Electric Co., Ltd.	
Ether, Ltd.	
Evershed & Vignoles, Ltd.	
Evode, Ltd.	
Ewart Chainbelt Co., Ltd.	
Expanded Metal Co. Ltd.	140

F

F.C. Construction Ltd.,	
Fibreglass, Ltd.	
Flavell, S., & Co., Ltd.	162
Fluxite, Ltd.	
Fowler, John, & Co. (Leeds), Ltd.	
Franki Compressed Pile Co., Ltd.	
Fraser & Chalmers, Engineering Works	
Fry's Metal Foundries, Ltd.	
Fyffe & Co., Ltd.	

G

Gas Chambers & Coke Ovens, Ltd.	
Gas Purification & Chemical, Ltd.	181
General Descaling Co., Ltd.	
General Electric Co., Ltd.	
General Gas Appliances, Ltd.	
Gibbons Bros., Ltd.	
Gibbons (Dudley), Ltd.	
Gibson, John, & Son, Ltd.	
Glover, George, & Co., Ltd.	121
Glover, Thomas, & Co., Ltd.	144
Godfrey, Sir George, & Partners (Industrial), Ltd.	178
Goodall Clayton & Co., Ltd.	
Goodyear Mechanical Goods	
Grant & West, Ltd.	
Graphite Products, Ltd.	
Green & Boulding, Ltd.	
Gunite Construction Co., Ltd.	

H

Hamilton, A. H., & Co., Ltd.	
Hardman & Holden, Ltd.	
Harris & Pearson, Ltd.	
Harrisons (London) Ltd.,	
Harvey, G. A., & Co. (London) Ltd.	127
Hick Hargreaves & Co., Ltd.	
Hilmor, Ltd.	
Hills (West Bromwich) Ltd.	
Holmes, W. C., & Co., Ltd.	183
Honeywell-Brown, Ltd.	
Horseley Bridge & Thomas Piggott, Ltd.	
Horstmann Gear Co., Ltd.	
Howden, James, & Co., Ltd.	131
Humphreys & Glasgow, Ltd.	142

I

Ideal Boilers & Radiators, Ltd.	
I.C.I., Ltd. (Metals Division)	179
Inertol Co., Ltd.	
Ingham, John, & Sons, Ltd.	
International Combustion, Ltd.	

J

Jeavons, E. E., & Co., Ltd.	
Jeavons Engineering Co.	134
Jenkins, W. J., & Co., Ltd.	
Jobling, James A., & Co., Ltd,	128

K

Keay, E. C. & J., Ltd.	
Keith Blackman, Ltd.	184
King, Geo. W., Ltd.	
King, Walter, Ltd.	181, 182
Kings Patent Agency, Ltd.	182
Kirk & Co. (Tubes), Ltd.	134
Kirkham Hulett & Chandler, Ltd.	

L

LaFarge Aluminous Cement Co., Ltd.	135
Laidlaw, R., & Son (Edin.), Ltd.	
Lamont, James H., & Co., Ltd.	
Lanarkshire Bolt & Rivet Co., Ltd.	180
Lancashire Dynamo & Crypto, Ltd.	139
Le Bas Tube Co., Ltd.	
Lionweld, Ltd.	
Lind, Peter, Ltd.	

M

Macpherson, Donald, & Co., Ltd.	175
Magnetic Valve Co., Ltd.	
Main, R. & A., Ltd	170, 171
Marco Conveyor & Engineering Co., Ltd.	
Meltham Silica Fire Brick Co., Ltd.	
Mercol Products, Ltd.	
Messenger & Sons, Ltd.	
Metropolitan Leather Co., Ltd.	
Milnes Meters, Ltd.	
Mitcham Smelters, Ltd.	
Mitchell, H., & Co.	
Moler Products, Ltd.	
Monk, A., & Co., Ltd.	
Morgan Crucible Co. Ltd.	
Morris Commercial Cars, Ltd.	

N

National Benzole Co., Ltd.	
National Enamels, Ltd.	
New Conveyor Co., Ltd.,	
Newton Chambers & Co., Ltd.	
Norwest Construction & Co., Ltd.	
Nu-Swift, Ltd.	181

O

Oakland Metal Co., Ltd.,	181
Olding, Jack, & Co., Ltd.	
Oxley Engineering Co., Ltd.	173

P

Parkinson & Cowan (Gas Meters), Ltd.	144
Parkinson Stove Co., Ltd.	
Pass, E., & Co., Ltd.	
Peckett & Sons, Ltd.	
Peebles & Co., Ltd.	
Pegson, Ltd.	
Perl Controls, Ltd.	143
Plus Gas Co., Ltd.	
Pollock & Peel, Ltd.	
Power Gas Corporation, Ltd.	
Pratt Engineering Co.	
Press, William, & Son, Ltd.	129
Pulsometer Engineering Co., Ltd.	

R

R.T.S.C. Home Sales Ltd.	
Radiant Heating, Ltd.	
Radiation, Ltd.	166, 167
Rawlplug Co., Ltd.	180
Reavell & Co., Ltd.	130
Richmond Welding Co.	181
Riley, A. J., & Son, Ltd.	
Roberts, R. E., & Sons, Ltd.	
Robinson, J. H., & Co. (Liverpool), Ltd.	137
Royles, Ltd.	
Russell Bros., (Walsall), Ltd.	176
Russell, R., & Sons, Ltd.	126

S

Salter, T. E., Ltd.	
Saunders Valve Co., Ltd.	
Scottish Non-Ferrous Tube Industries, Ltd.	
Senior Economisers Ltd.	
Service Electric Co., Ltd.	126
Siebe Gorman & Co., Ltd.	130
Sigma Instrument Co., Ltd.	
Simon-Carves, Ltd.	
Simon, Richard, & Sons, Ltd.	
Sisson, W., & Co., Ltd.	
Smith Meters, Ltd.	Cover I
Smith, Thos. & Sons (Rodley), Ltd.	
Southalls (Birmingham) Ltd.	
Spence, Peter, & Sons, Ltd.	
Spencer Bonecourt, Ltd.	
Sperryn & Co., Ltd.	121
Stanton Ironwork Co., Ltd.	
Staveley Iron & Chemical Co., Ltd.	133
Stein, John G., & Co., Ltd.	
Stelcon (Industrial Floors), Ltd.	
Stewart & Gray, Ltd.	
Stewarts & Lloyds, Ltd.	
Stoves, Ltd.	
Strachan & Henshaw, Ltd.	
Stringer Bros.	182
Sutcliffe Speakman & Co., Ltd.	
Sutherland, A. G., Ltd.	

T

Thomas & Bishop, Ltd.	
Thomas (Richard) & Baldwins, Ltd.	
Thompson, John, Conveyor Co.	
Thorp, Thomas, & Co., Ltd.	
Tubela Engineering Co., Ltd.	
Tucker Eyelet, Geo., Co. Ltd.,	176
Tully, Sons & Co., Ltd.	
Turners Asbestos Cement Co., Ltd.	

U

Underpressure Engineering Co., Ltd.	
United Kingdom Construction & Engineering Co., Ltd.	Cover II

V

Vale, Thomas, & Sons, Ltd.	
Visco Engineering Co., Ltd.	
Vulcan Stove Co., Ltd.	

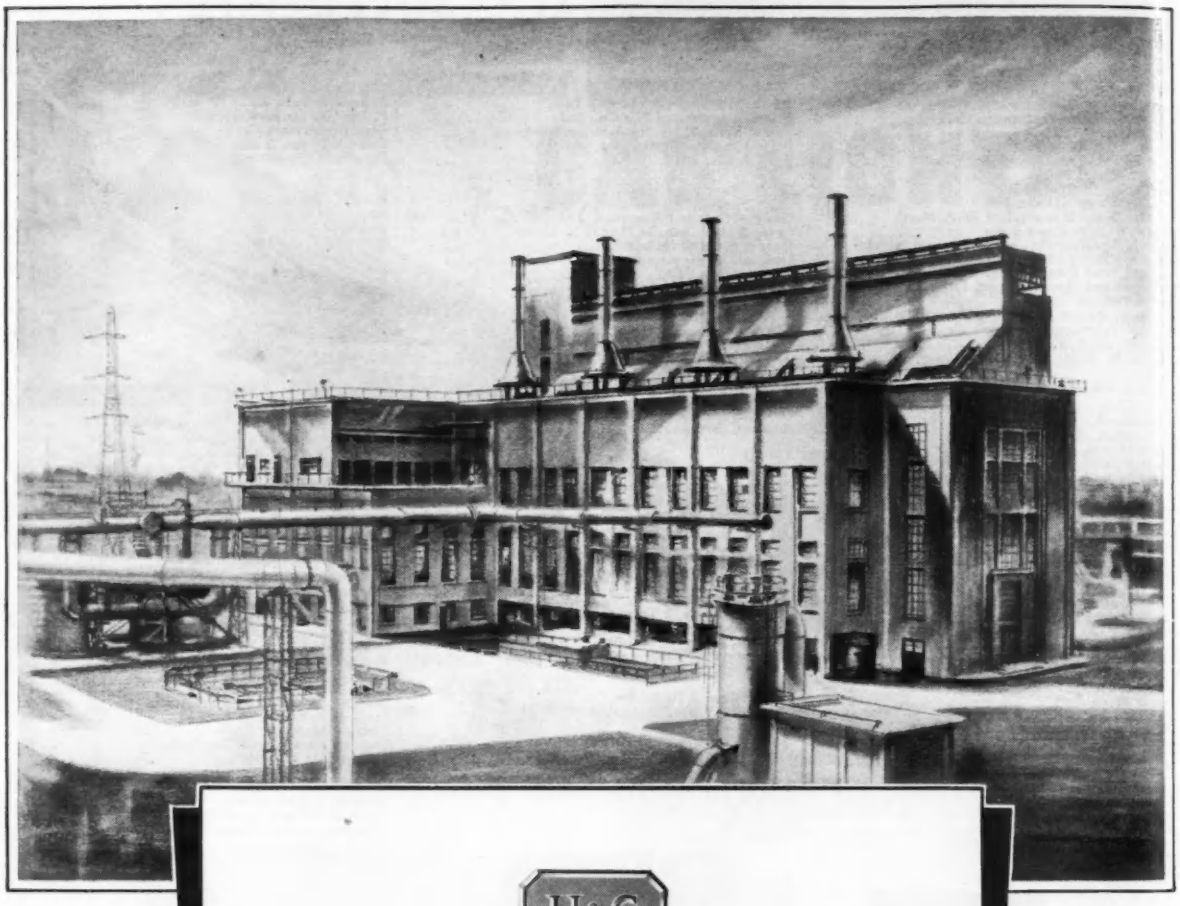
W

Wakefield, C. C., & Co., Ltd.	
Wakelin, F. H., Ltd.	182
Walker, C. & W., Ltd.	
Walker, Crosweller & Co., Ltd	
Waller, George, & Son, Ltd.	136
Ward, Thos. W., Ltd.	168
Warsop Power Tools Ltd.	
Weatherill, F. E. Ltd.,	132
Wellington Tube Works, Ltd	
Wellman Smith Owen Engineering Corpn., Ltd.	
West's Gas Improvement Co., Ltd.	Cover III
West Hunwick Silica & Firebrick Co., Ltd.	
West's Piling & Construction Co.	
Westwood & Wrights, Ltd.	
Whessoe, Ltd.	123
Wilkes, A. H., & Co., Ltd.	
Willey & Co., Ltd.	
Williams, John E., Ltd.	
Williamson Cliff, Ltd.	
Wilson, George, Gas Meters, Ltd.	
Winn & Coales, Ltd.	
Woodall-Duckham Vertical Retort & Oven Construction Co. (1920), Ltd.	161
Wood, Hugh, & Co., Ltd.	
Wright, Alexander, & Co., Ltd.	

Y

Yorkshire Copper Works, Ltd.	

Agencies	
Appointments Vacant	181, 182
Appointment Wanted	
Contracts Open	
Educational	
Fellowship	
Miscellaneous	182
Notice	
Patents	182
Plant For Sale	
Publications	182
Repairs	



H&G

INSTALLATIONS ABROAD

Carburetted Water Gas Plant, Gennevilliers, Paris, built by

SOCIÉTÉ DE CONSTRUCTION D'APPAREILS POUR
GAZ A L'EAU ET GAZ INDUSTRIELS

HUMPHREYS & GLASGOW LTD.

HUMGLAS HOUSE · CARLISLE PLACE · LONDON SW1

Telephone: VICtoria 3961

ESTABLISHED 1892

EVERYTHING under CONTROL

by PERL

THERMO-ELECTRIC SYSTEMS

PROVEN · ACCEPTED · LOW COST

JUNOPERL and THERMOPERL	FOR SINGLE OR MULTI-BURNERS—Up to 150 cu. ft. hr. and up to 900 cu. ft. hr. Pilot supply can be taken from the body and is controlled.
JUNOPILOT	FOR MULTI-BURNERS—Up to 150 cu. ft. hr. per burner, or in weep line for larger rates. Independent and controlled pilot supply.
MINIPERL	FOR WEEP CONTROL. ETC.—Particularly suitable for Central Heating Boilers, if pilot control not essential. Also for other applications.
BRIDGING LADDER SYSTEM	FOR MULTI-BURNERS—Valve may be fitted direct in supply up to 900 cu. ft. hr. or in weep of relay valve for larger rates.

OTHER DEVELOPMENTS ON WAY

IF YOUR PROBLEM IS FLAME FAILURE CONTROL — WE CAN SOLVE IT!

Please ask for details of the full range of "PERL"

AUTOMATIC TEMPERATURE AND SAFETY CONTROLS

PERL CONTROLS LIMITED

672 · FULHAM ROAD · LONDON S.W.6 PHONE: RENown 4048 2323

Gas Journal

105th YEAR OF PUBLICATION

EDITOR: NORMAN S. SMITH, B.Sc. (Gas Eng.)

11, BOLT COURT, FLEET ST., LONDON, E.C.4. Telephone: CENtral 2236-7 Telegrams: Gasking, Fleet.

VOL. 275 NO. 4702 July 15, 1953

CONTENTS

Page

EDITORIAL COMMENT

A Lecture on Furnace Heating ... 145
Liquid Purification ... 146
Our Sister ... 146
The Sickness of Coal ... 147
Strictly Instrumental ... 147

PERSONAL ... 148

NEWS OF CURRENT EVENTS

Natural Gas in Great Britain ... 148
Diary ... 148
South Western Section, Institution of Gas Engineers ... 148
Northern Junior Gas Association at Sunderland ... 149
Kent County Show at Maidstone ... 149
Visit of Wales Gas Board to Llandudno Hotel and Catering School ... 165
Northern Gas Consultative Council ... 172
The Testing of Timber ... 172

FEATURE ARTICLE

British Instrument Industries Exhibition ... 150

IN PARLIAMENT

Distribution of Fuel Saving Appliances: Atmospheric Pollution Enquiry: Gas Company Stockholders Compensation ... 169

TECHNICAL RECORD

The Operation of Deep Purifiers. By R. Whiting, Divisional Engineer, Ipswich Division, Eastern Gas Board. Paper to Eastern Section, Institution of Gas Engineers 153

The 'Manchester' Liquid Purification Plant at Linacre. By L. G. Townsend, M.Sc., M.Inst.Gas E., F.R.I.C., Deputy Chief Chemist, Liverpool Group, North Western Gas Board. Abstract and Discussion of Paper to the Institution of Gas Engineers ... 159

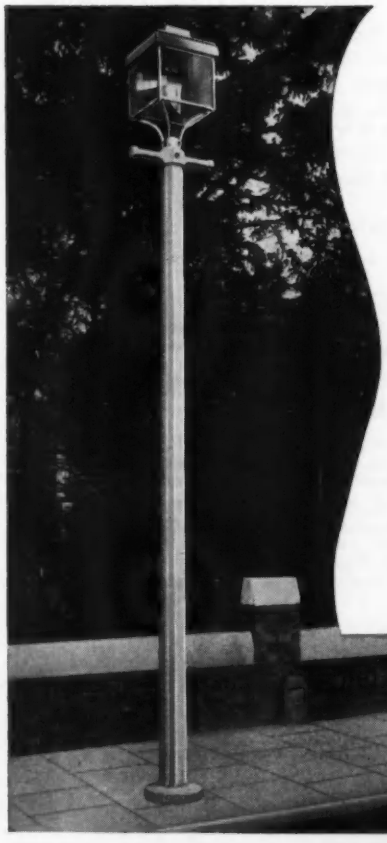
Subscription Rates: Home and Empire 52/-; Foreign 60/-

Full Publishers' Notice: See Page 181.

Gas Journal . . . . Walter King Ltd.

THOMAS GLOVER
& CO. LTD., EDMONTON
LONDON, N.18 & BRANCHES

We also supply 1/- & 2/6 Meters.



Low cost lighting schemes by MAXILLA

For Group B thoroughfares, the famous Maxilla range of lanterns provide first class illumination at the lowest capital cost. Fit Maxilla Lamps and bring your street lighting up to date.

PARKINSON & COWAN
GAS METERS
(A DIVISION OF PARKINSON & COWAN LIMITED)
LIGHTING DEPARTMENT (Q)
COTTAGE LANE WORKS
CITY ROAD, LONDON, E.C.1

L. 2

GAS JOURNAL

VOL. 275. No. 4702 105TH YEAR July 15, 1953

A LECTURE ON FURNACE HEATING

IT has been said before that the day is gone when town gas is applied to furnaces designed, often pretty roughly, for the use of coal just by the insertion of one or more gas flames into the combustion chambers. Solid fuel firing has always been more highly developed on the larger scale. The study of thermal conditions in the boiler combustion chamber and in the furnaces and processes of the iron and steel industry has always been well advanced. These are generally very large furnaces where precision of control, we say it with diffidence, is not of the first importance and where a refined fuel is not particularly called for. Gas engineers assembled in annual conference were interested in Professor R. J. Sarjant's lecture on furnace heating principally because they could not fail to be interested in developments which are taking place in that same precision of control of solid fuels in furnace practice, that is, in the field where gas has long enjoyed preeminence.

Much of Professor Sarjant's paper was somewhat too academic and specialist for the majority of his audience, though no doubt of value and interest to the industrial gas engineer upon whose efforts the industry will increasingly rely for the extension of gas in the industrial market. But some of the more general aspects of these problems had a wider appeal. The gas industry has always been aware that the cost per therm of potential heat in the form of coal is, and must be, lower than that in gas. Gas must justify the cost inevitable in its production not so much by its intrinsic cost as by its high efficiency of utilisation in a great many industrial processes, by its ready amenability to precision control both of temperature and atmosphere, and by several collateral advantages—cleanliness, elimination of handling and storage costs whether of fuel or ash, advantages rendering it indispensable in many cases, and often achieving an overall economy in operation. But what the gas industry is bidden, in this paper, to recognise is that gas is being overtaken in some of these points by solid fuels, particularly in the bigger furnaces. Mechanical firing of solid fuel direct to the furnace, the use of the producer, instrumentation, are enabling coal to be used without smoke and with close control both of furnace temperatures and of the furnace atmosphere. The aim is towards a 'coal burner,' rather than a mechanical stoker, with close control of excess air.

At this point one's thoughts turn to pulverised coal. Surely this is the form of solid fuel firing which approximates most closely to the advantages of gas in control. But the lecturer treated it, we thought, rather coldly. No doubt the reason was that the elaboration of pulverisation is such that it is only applicable on a very large scale where 'the gas engineer must regard this process of coal utilisation as outside the field of competition.' It must be admitted that town gas is always likely to be unsuited to mass generation of heat; it is better suited to the close control of high temperature processes.

Turning to coke, can one detect a gleam of humour in Professor Sarjant's remark about the economic mystery of the remarkable stability in the coal/coke cost ratio? At any rate he is no doubt correct in his view that in the sort of general furnace practice to which the industrial gas engineer looks coke will be used in the preliminary preparation of producer gas. Dr. D. T. A. Townend pointed to the new down-jet burner as a useful and efficient means of using coke; its main attraction is that it deals with the inevitable ash in a very effective way.

The very short paragraph on gaseous fuels is most significant. Possibly Dr. Sarjant did not expand it because he would be merely preaching to the converted. There were, he said, great potentialities in the use of gaseous fuels, *because* (our italics) they may be desulphurised. We must really heed this. The evils of sulphur dioxide emission are not only increasingly recognised in damage to health and property but the presence of sulphur in town gas is being turned against the gas industry by the coal utilisers. In suitable applications the thermal efficiency of the continuous gas-fired tunnel-type furnace is unapproachable mainly because of its incomparable facility in recuperation, but Dr. Sarjant points out that the metallic recuperator and hot face insulation in their modern developments are enabling the intermittent batch-type furnace to run it very close. Whether a consistent gas density, highly desirable no doubt, is quite so essential, is another matter—at least within such narrow limits as those suggested by Dr. Sarjant. Mr. L. T. Minchin commented that a constant Wobbe index would suffice. The difficulties of doing this are inherent in mixtures inevitable in times of peak load but, while variations interfere with accurate experiments in a university, is it so certain that they present insurmountable difficulties in most industrial processes?

The experiments themselves and their results will

no doubt be useful in furnace design where accurate suitability to purpose is so desirable. There remains the art of furnace construction which includes the application of heat recovery, of mechanical devices for loading and unloading in such a way as to save labour and prevent the loss of heat, and of instrumentation in many forms and combinations for accurate and efficient control.

The discussion reached a high level with Dr. Townend engaging in equal terms with the author and with several of our leading industrial gas experts bringing in the fresh air of practical experience, coming in as it were, straight from the field of battle where they are heavily engaged in meeting the strong competition of oil and solid fuel with gas at ever-rising prices. At the present time it is mainly to our industrial gas engineers that we look to maintain the level of consumption upon which the life of the industry depends.

We are left with the doubt whether it was desirable to introduce into the Proceedings of the Institution an occasional contribution from what we hope we may describe without offence to so old a friend as an 'outside authority,' and whether if so this paper was not more suited to the severe atmosphere of the autumn research meeting.

LIQUID PURIFICATION

THE substitution of liquid for dry oxide purification is an ideal which has attracted gas engineers for a very long time. Its main advantages were well set out in Mr. L. G. Townsend's excellent paper to the Institution of Gas Engineers. Apart from its recovery of sulphur in a more immediately valuable form perhaps these advantages can be summed up in the substitution of continuous for intermittent or bulk handling of the purifying material and of the resulting products. No doubt Mr. Townsend's paper will be of immense interest and value to present and future designers and operators. Its great merit at the June meeting of the Institution was that it evoked an outstandingly lively and informative discussion. Most of the speakers applied themselves strictly to the paper, to the plant described in it, or to similar ones in this country. It was Mr. R. J. S. Thompson who brought in a breath from the outside and showed among other things that the fundamental ideas of the Manchester process had arisen in more than one place. One of his more critical points was that the liquid process involved the handling of vastly more material per ton of sulphur recovered than the dry oxide process. But we suggest that continuity of handling will, as design improves on further practice, reduce this disadvantage. The handling of oxide does not lend itself very readily to mechanical aid. A more real difficulty is the sensitivity of liquid processes to hydrogen sulphide concentration, and the way out of this is not so clear.

Have we reached the point where liquid purification can reduce sulphuretted hydrogen content to the required standard of gas purity? The plant in its present form cannot be operated without catch boxes. But the reason for this is want of mechanical security, a want which designers should have no difficulty in removing. If, however, a liquid process is to become standard gasworks practice, it must go further than this. It must be able to deal with all the usual mixtures which go to make up town gas. It is evident that further modifications either of design or operation will be necessary before this goal is reached. But as a result of experience at Linacre and elsewhere there is no reason why a completely reliable plant without catch boxes could not be designed.

Those are the main observations and conclusions arrived at by Mr. Townsend after 3½ years working of the plant he described. Two other points are of interest, the practicability of using the indigenous ammonia instead of imported soda ash, and the satisfactory recovery of sulphur, albeit overshadowed by possible increased trouble with effluent. Mr. Townsend's claims relating to costs are, very properly, modest and guarded. Evidently the difference between the new and the old is very small either way, but many of the minor advantages are well worth paying for, if indeed they will not cancel out the adverse balance in the long run. To be rid of the labour problem in the handling of oxide would be an unmixed blessing. Mr. J. J. Priestley pointed out that the absence of air admission to purifiers might well amount to a reduction of inerts of 3% to 4% of the gas volume. What is that worth in reduced coal-cost per therm of gas? The ground space occupied by the dry oxide purifier has long been a reproach to the industry. Capital costs reduced by half, more rapid erection, reduction in back pressure are all points of value in favour of the new system.

The recovery of sulphur is evidently one of the problems still awaiting complete solution. Mr. Townsend's account of the development of the process finally arrived at will be studied with interest and profit. The end product containing 90% to 95% sulphur must be a great advance on 'foul oxide' and should command a higher price. Dr. Arthur Marsden dealt with this problem at considerable length. How far is the greater value of the sulphur cake to be discounted by the increased cost of effluent treatment or disposal? No doubt the use of a liquid purifying medium is not the only way to secure continuity of mechanical operation. Mr. Thompson was the only speaker to mention the Bournemouth dynamic purifier, which seemed to him to be basically sound, and of which we should all like to know more in detail. Fluidisation is round the corner. One or other of these systems, or perhaps more than one, may well supersede the dry oxide purifier box which has so long been a conspicuous part of the gasworks.

OUR SISTER

IT is to be expected that when two journals dealing with one industry are published from the same address, with editorial departments on the same floor, and sharing most of the facilities of the buildings, a large measure of co-operation and inter-working would ensue. And it is true that at Bolt Court where the *Journal* and *Gas Service* are produced, there is indeed a close relationship. No more than a wall divides the two; but while for many purposes that wall does not exist or has a pleasing transparency on certain occasions its thickness becomes that of the mediaeval keep.

The fact is that each journal has its own personality and outlook; it is right that it should be so. And although most incoming material is shared—the good

with a certain reluctance and the indifferent with a disarming generosity—there is no reason to suppose that it will appear in the two journals in the same way. In point of fact, the overlapping of published news is slight owing to the specialist nature of the two journals, and it is seldom that one has more than a sketchy idea of the other's plans until publication day. Each journal is received in the other's department with a keen scrutiny and comparative silence. This is no mutual admiration society and it is seldom that much comment is exchanged, except the occasional remark that it was a pity about so and so when a more than usually unfortunate lapse on the part of the printer escaped detection in the opposite journal, or when some particularly searching post-mortem is undertaken by a Higher Authority.

However, although perhaps swift to chide and slow to bless, we are not incapable of congratulation or of appreciating that the success of one reflects credit on the publishing house as a whole. Thus in the English tradition of the man who writes to *The Times* about his next door neighbour rather than speak to him himself, we would like in these columns to bestow a modest pat on the back to our young sister *Service*, not only for producing something bright and interesting each month, but for making the July issue outstanding. We cannot help feeling that with the accent increasingly on salesmanship and selling. *Gas Service* provides the sales and service side of the industry with just that fillip it requires. And from what we know of its plans—which admittedly is not much—it is reasonable to suppose that it must play an increasingly important part in the competitive years ahead.

THE SICKNESS OF COAL

THE *Sunday Times* published in its issue of July 5 an article entitled 'The Sickness of Coal.' The author, George Jones, spent his working life as a coal-miner, trade union leader, and National Coal Board executive. He recently retired from office in the N.C.B., which is regrettable because his article now demonstrates his exceptional ability to diagnose the several ills which afflict the coal industry today. Nobody, except those to whom he attributes responsibility for failure to produce enough coal, will disagree with what he says. But since he points to the failings in the personnel of so many of the separate bodies which comprise the coal industry—the N.C.B., the Divisional Boards, managements, unions, and miners—the aggregate measure of agreement which he will receive from within the industry is unlikely to be great. But it is worthy of note that he emphasises that shortcomings among the miners are really attributable to some other body. For example: 'The men in the mines were not ready for the great opportunity presented by nationalisation' and, 'The Board, in its present state, has failed completely to inspire the men in the pits.' His statement, 'the men in the mining industry must clearly see that nothing but coal coming from the pit in larger quantities can improve their lives and working conditions,' seems to lack conviction and to create a complex situation. The N.C.B. have claimed that they have provided the men with better conditions, the unions have claimed that they have won improved standards for the miner, and the miner himself claims to have won a great social victory. *And all this without more coal.* We would say the words 'maintain and further improve their lives' would better the quoted phrase. We outside the industry agree with most of George Jones's sentiments. But, at the same time, he disappoints us. He does not fail to prescribe remedies for 'frustrationitis,' but he makes no attempt to suggest how the various organs of the coal industry's sick body might be induced to submit to the necessary surgery.

His plea to 'get the men in the industry to think and act big' is unlikely to be interpreted by the readers of the *Sunday Times* in quite the way the author intended. The fact that big America thinks in a big way is no sure indication that a relatively small country with different traditions, values, and perspectives will achieve sure success by adopting the same policy. But on one point George Jones will receive substantial agreement. In the present direction of industrial social development the balance of power over the worker has shifted from the employer to the union leader, and the interests of the latter are served by a policy which diverges sharply from the workers' inborn desire to pursue the straightforward policy of a good day's output for a good day's pay.

STRICTLY INSTRUMENTAL

IT IS GENERALLY conceded that the key to productivity in industry today is efficient instrumentation, and the importance of instrument manufacture was clearly stressed by the staging at Olympia, between June 30 and July 11, of the British Instrument Industries Exhibition. The part played by instruments in our industrial economy was described by the Minister of Supply, the Rt. Hon. Duncan Sandys, in his speech at the inaugural luncheon. 'Precision instruments for measurement and for control are playing a very important part in industrial production,' he said, 'and if I were presumptuous enough to give any advice to British industry it would be to expand more and more the use of instruments in production. There is no doubt that they are extensively used in a great part of our industry, but there are undoubtedly sections which do not take advantage of what our instruments can offer, to the same extent as certain of our competitors overseas. . . . The demand for precision instruments is great and is likely to be greater. It is so great today that we have now to face the necessity for mass production at reasonable prices, whereas a few years ago we could contemplate the production of precision instruments in an altogether different way.' Later, Mr. Sandys referred to research: 'If there is one thing in this country in which we excel, it is in ideas. Sometimes we haven't the facilities, the money or the manpower to apply those ideas to the practical problems of the day as quickly as some other people. But I don't think anybody in the world would dispute the fact that per head of population there is as much scientific and technical brain power in Great Britain as in any other part of the world.' The exhibition was a considerable success and a number of the 200 manufacturers took the opportunity to introduce new developments. Some of these were of direct interest to the gas industry and are briefly reviewed on later pages.

THE BRITISH CHEMICAL PLANT MANUFACTURERS' ASSOCIATION has issued a booklet on *Service to Members* which outlines the history, organisation, and services of the Association, and has been prepared for the benefit of firms enquiring about membership. Formed in 1920 under the auspices of the Association of British Chemical Manufacturers, the B.C.P.M.A. acquired its own offices in 1943, and in 1944 it absorbed the chemical plant section of the Food Machinery and Chemical Plant Export Group formed in 1940 at the instance of the Board of Trade. Among its services to members are guidance on advertising, building licences, chemical plant enquiries, export promotion, import licensing, a fortnightly information bulletin, representations on iron and steel rationing, liaison with the British Standards Institution on standardisation, and help in regard to passports and other travel arrangements. The Association has operated since 1948 from 14, Suffolk Street, S.W.1, from which address copies of the booklet may be obtained.

Personal Notes

SIR EDWIN S. HERBERT, LL.B., has been appointed a Director of the Imperial Continental Gas Associatoin.

MR. J. P. SMITH and MR. W. A. DOBSON have been appointed directors of Metropolitan Gas Meters. Both are Directors of Meters, Ltd.

MR. T. DIXON, Comptroller, Mr. L. H. ROLFE, Development Engineer, and MR. E. J. SPURRIER, Sales Manager, have been appointed Divisional Directors of Parkinson and Cowan Gas Meters.

MR. J. HIGGINS, Depôt Superintendent of the Hammersmith Depôt of National Benzole Co., Ltd., has completed 30 years' service with the Company. Joining as an office boy, he became a clerk at the Croydon Depôt in 1928, Depôt Foreman in 1935, and on the demerge of the Petroleum Board in 1948 was appointed to his present post.

MR. W. H. BOURNE has been appointed General Manager of the London and Counties Coke Distributors' Association as from September 1, 1953. Mr. Bourne, who is at present General Manager of the Co-operative Wholesale Society's Coal Department, Northern Area, is a member of the Merchant Consultative Committee and the Industrial Coal Consumers' Council. He has thus a wide experience of the distributive trade.

MR. PETER P. MACDIARMID, Deputy Chairman of Meters, Ltd., and a Director of Metropolitan Gas Meters, Ltd., and associated companies, has resigned to take up an appointment with the United Gas Industries Group of Companies, where he has been elected to the boards of their subsidiaries, Alder & Mackay, Ltd., J. H. Robinson & Co. (Liverpool), Ltd., Smith Meters, Ltd., the Sutherland Meter Co., Ltd., the Vulcan Stove Co., Ltd. and Willey & Co., Ltd. Mr. MacDiarmid, a native of Edinburgh, is a graduate of Manchester University, and prior to joining the gas industry held executive posts with Lewis's Ltd., the departmental store organisation, for 13 years, on the administrative and selling side. For five years he was Chief Administrative Assistant to the gas undertaking of the Salford Corporation before joining Meters, Ltd.

MR. E. B. CRADDOCK, Engineer and General Manager, Aylesbury and District undertaking, Southern Gas Board, has been appointed Group Manager, Northampton, in place of MR. J. CORRIGAN, who was recently appointed as Divisional Sales and Service Manager, Leicester and Northants Division. Mr. Craddock will take up his appointment on October 1.

MR. J. FIRMINGER, who recently joined the technical sales staff of Winn & Coales, Ltd., manufacturers of 'Denso' anti-corrosion products, previously held various technical appointments, primarily in the petroleum and chemical industries. He is an Associate Member of the Institute of Petroleum. In 1936 he entered the service of the International Association (Petroleum Industry), Ltd., and was later transferred to the technical staff of Esso European Laboratories where he remained for two years, afterwards joining Esso Development Co., Ltd., as an assistant chemist. From 1949 up to the time of his present appointment he was technical director of Kayeff Industrial Products (Mfg.), Ltd.

MR. ROLAND WINN is appointed a Director of Thomas Summerson & Sons. Ltd. He joined the company in 1905 and has been company secretary since 1933. Mr. A. F. TOSH, Works Manager of Summerson's Foundries, Ltd., is made a Director of that company. Mr. Tosh has worked in the foundry industry for over 50 years, and prior to joining Summersons in 1942 he was with Baldwins, Ltd. (now the Steel Company of Wales), as manager of their Landore Foundry. He has been a member of the British Iron and Steel Institute for over 20 years. Mr. C. WHITEHOUSE, Works Manager of Summersons Railway Workshops at Spennymoor, has also been appointed a Director of Copelaw Engineering Company, Ltd. Mr. Whitehouse joined Thomas Summerson & Sons, Ltd., in 1920. Mr. George V. NEWLANDS has joined Thomas Summerson & Sons, Ltd., as Works Engineer on the retirement of Mr. Walter Scott. Mr. Newlands, who served his apprenticeship with Cammell Laird & Co., Ltd., has resigned from T. & J. Brocklebank with whom he has been serving as a senior sea-going engineer officer.

South Western Section Ladies' Day

IN RATHER DISAPPOINTING Torquay weather, the bay and palm trees shrouded in a slight haze, about 120 engineers and their ladies gathered under the chairmanship of Mr. J. W. Denton, G.M. (Sub-Divisional Manager, Torquay). The morning was occupied with a tour of Hollacombe works and was followed by lunch at the Victoria Hotel.

Mr. J. T. Haynes (President, Institution of Gas Engineers), in proposing the toast of the South Western Section, thanked them for their continued support of the Institution and their valuable technical contributions, and mentioned the encouragement which they must inherit from the Chairman of the South Western Gas Board, himself a Past-President of the Institution of Gas Engineers. As reigning President, Mr. Haynes continued, he had witnessed the scene of the Coronation in Westminster Abbey, a scene which would remain forever in his mind, and much too magnificent to describe. He then asked all to drink the toast, coupling with it the name of Mr. Denton. In his reply, Mr. Denton read apologies for absence from Mr. C. H. Chester (Chairman, South Western Gas Board), Mr. James Carr (Area General Manager), and Dr. W. T. K. Braunholtz (Secretary, Institution of Gas Engineers).

Mr. L. P. Ingram (Divisional Manager, Southern Division), in proposing the toast of the guests, welcomed Mr. and Mrs. J. T. Haynes, Mr. O. Pincock (President, Western Junior Gas Association), Mr. J. S. Smith (Ministry of Fuel and Power), and Mr. and Mrs. R. Clark, who since their retirement from Plymouth were always welcome guests. Mr. J. S. Smith responded.

In the afternoon nearly all the company boarded the motor vessel 'Kiloran' for a trip round Torbay and into the River Dart.

Diary

July 20.—EASTERN G.C.C., Connaught Rooms, Kingsway, London, W.C.2, 2 p.m.

July 22.—NORTHERN JUNIOR GAS ASSOCIATION: Visit to works of Clark, Chapman & Co., Engineers, Gateshead, 2.30 p.m.

Natural Gas in Britain

By P. J. Walker

THE recent announcement by Sir Harold Smith, Chairman of the Gas Council, that a large-scale exploration for natural gas is to be made in this country over the next five years or so brings to mind a sensational discovery at Heathfield just over half a century ago. Efforts to develop a find of natural gas were made at Heathfield at the turn of the century following an accidental discovery some six years earlier.

Natural gas 'came to light' when the railway company were boring in order to secure a better water supply. The story was told by a correspondent to *The Times* in 1902. Boring had been carried out to a depth of 377 ft., but no considerable amount of water was found and the attempt was abandoned. But instead of finding water, the engineers found gas.

At first a smell of gas was disregarded as being due merely to foul air in the bore tube, but at a depth of 312 ft. the smell of gas was so pronounced that someone daringly applied a light to the top of the tube. There was a huge burst of flame, which was extinguished only with considerable difficulty. A pressure of gas at about 140 lb. per sq. in. was found to exist and it persisted for about six years.

With this natural gas the railway company illumined the station, using fish-tail burners because incandescent mantles were blown to pieces by the pressure. Beyond this, nothing was done until 1901, when some Americans began serious investigation, and for some years the work of exploration and development proceeded 'by the aid of English capital and English brains.' A company called the Natural Gas Fields of England, Ltd., came into being. One borehole reached a depth of 400 ft. and several others were sunk. Work went on night and day and the gas found supplied both light and power for that work.

The Times correspondent recorded that the output of the deepest boring was something like 15 mill. cu.ft. a day, equivalent to one-eighth of the total daily sale of gas in London at that time. This gas came from the Kimmeridge clays, and it was suggested that the area over which these were known to exist made it probable that the East Sussex gas field was larger than any known to exist in America.

The Heathfield gas, burnt without previous enrichment of any kind, gave a candle-power of 12 to 14 and supply pipes were laid to a number of houses in the town.

According to a local directory, the lighting of Heathfield station by means of the natural gas was discontinued before the second world war, when the gas was being taken away in cylinders.

[The foregoing is an extract from the *Sussex County Magazine*, July, 1953.]

Northern Juniors at Sunderland

THE 5th annual general meeting of the Northern Junior Gas Association was held at the Seaburn Hotel, Seaburn, Sunderland, on June 26, when the President, Mr. R. WILLIAMSON, Sunderland, gave his Presidential Address.

Opening the business session Mr. WILLIAMSON referred with regret to the death of one of their members, Mr. A. Pillans, of the St. Anthony's by-product works. It was also intimated that Mr. W. O. Kirkwood would be handing over the Treasurership of the Association to Mr. G. E. Haddon. Mr. Williamson, on behalf of the members, thanked Mr. Kirkwood for the great deal of work he had done for the Association.

It was unanimously agreed to make a Coronation Year contribution of five guineas to the Benevolent Fund of the Institution of Gas Engineers.

The Transaction Secretary's report was read for Mr. S. Jones in his absence. It was announced that some 43 copies of the Transactions had already been ordered and members were urged to place their orders as soon as possible.

Mr. R. Williamson then delivered his Address. A vote of thanks to the President was proposed by Mr. K. E. BROWN, Newcastle, and seconded by Mr. S. N. P. NELSON, West Hartlepool.

The following officers were elected for the ensuing session.

President: T. R. Wicks, Workington.

Senior Vice-President: C. Hindle, Darlington.

Junior Vice-President: P. N. Lee, Middlesbrough.

Hon. Secretary: R. Aynsley, Newcastle.

Hon. Treasurer: G. E. Haddon, Stockton.

Hon. Transactions and Publicity Secretary: P. N. Lee.

Hon. Auditors: A. O. Old, West Hartlepool, and D. Yule, South Shields.

Members of Council: H. Milner, Sunderland, and G. W. Robson, South Shields.

Education Committee: W. O. Kirkwood, Sunderland, P. J. Webster, West Hartlepool, and C. Hindle, Darlington.

Mr. G. W. Perks, Stockton, Chairman. North of England Section, Institution of Gas Engineers, and Mr. F. J. Webster, Hon. Secretary, were elected to Honorary Membership of the Association.

The President presented to Mr. E. L. Robson, Newcastle, the Silver Medal of the Society of British Gas Industries for his paper 'An Introduction to Prestressed concrete.'

Mr. Williamson, the retiring President, received a certificate from his successor, Mr. WICKS, who expressed the hope that it would remind him of a very happy year of office.

A vote of thanks to the retiring President and Officers was proposed by Mr. H. WAITON, Howden. A tribute was paid to Mr. W. O. Kirkwood for his pioneer work and for the service he rendered to the Association as Treasurer. The good wishes of the Association were also extended to Mr. S. Jones, who is leaving the area to take up a new appointment.

Mr. AYNSLEY, Secretary, acknowledging the vote of thanks, said the Northern Juniors had every reason to be proud of the progress they had made over the past five years, in which time they had doubled the membership.

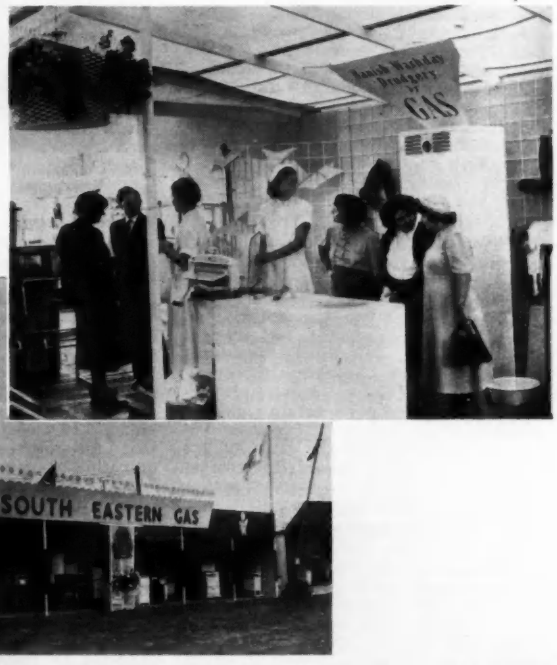
Mr. KIRKWOOD referring to the fact that he had been called the father of the Association, said he did feel a certain amount of pride at the progress the Association had made during its first five years. They must, however, thank the North of England Section of the Institution, without whose financial help they could not have carried on.

Members later adjourned for tea after which a vote of thanks was moved to Mr. Kirkwood, and the Northern Gas Board for the hospitality received.

The President of the Northern Junior Gas Association, Mr. R. Williamson (centre), photographed with members of the Council prior to the annual general meeting at Sunderland.

The North Western Gas Board is to be urged to end 'an open invitation to thieves' at Brinnington, Stockport. Backing the appeal is the Eastern Committee of the North Western Gas Consultative Council, which has received a 'considerable petition' from a group of Brinnington residents protesting that their prepayment meters for gas are fitted outside the house and are constantly being broken open and the contents pilfered. Alderman W. Onions said a resolution had been approved calling for the provision of 'valueless' tokens for inserting into the meters instead of coins if it were not practicable to move the meters themselves, or alternatively that the Gas Board should make itself fully responsible for any losses through pilfering.

KENT COUNTY SHOW



The South Eastern Gas Board's stand at the Kent County Show at Maidstone was described in last week's issue. An impression of the stand may be gained from these photographs, showing the façade and the laundry demonstrations in progress.

A REVIEW OF THE RECENT BRITISH INSTRUMENT INDUSTRIES EXHIBITION AT OLYMPIA

INSTRUMENTS on Exhibition

AT Olympia, from June 30 to July 11, British instrument makers met again, after two years, to display their craftsmanship to the world. The exhibits on nearly 200 stands in the National Hall provided convincing proof of the growing scope of the industry and of the help it is providing to scientists in their vital research work and to industrialists in the all-important strugg'e for the economic and financial stabilisation of this country.

A note concerning this growing industry and its contribution to industrial progress appears elsewhere in this issue. The following notes are concerned only with the individual exhibits, from which we have selected those which are most likely to interest the gas industry.

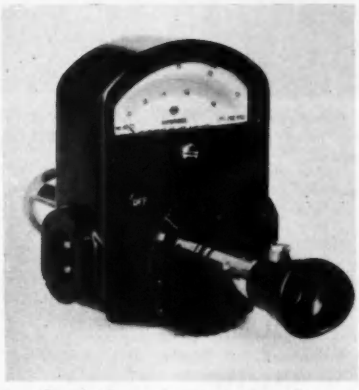
Bailey Meters & Controls, Ltd., exhibited the latest arrangement of console desk incorporating miniature instruments for controlling a 'unit' power plant comprising boiler and turbo-alternator with auxiliaries such as pulverisers, fans, feed heaters, de-aerators, circulating pumps, etc. The miniature measuring units for flow, pressure and temperature utilised an electrical transmission system, whilst the control units were air-operated and co-ordinated with the usual Bailey automatic control system. The 'Levelscope,' a recent development in the use of industrial television for transmission of boiler gauge glass reading with receiver in the control room or firing floor, was shown, and in addition to the usual range of indicators, recorders and controllers, the Company displayed single and multipoint temperature indicators, gas analysis equipment and combustion efficiency instruments.

Bristol's Instrument Co., Ltd., exhibited the Bristol 500 series recorders and controllers, among which was a complete range of instruments for measurement and control of pressure vacuum, temperature and flow, including examples of proportional integral, 3 term and cascade control, together with a range of telemetering instruments for multi-channel transmission nad remote supervisory control of process variables. Also on display was the Bristol range of voltmeters, absolute pressure gauges, production time recorders and examples of unit panel construction.

British Arca Regulators, Ltd., showed the very wide range of Arca valves from ¼-in. bore to 24-in. bore. Included were diaphragm valves of new design, and valves of lever operated and integral cylinder action, electrically operated motorised valves, butterfly, three-way mixing and diverting valves were also on view. A standard gas pressure regulator mounted on an oil pumping unit of 150 g.p.h. capacity typified the range of gas controls, and some electrically-operated controls were also shown together with a typical Arca instrument panel.

The British Rototherm Co., Ltd., exhibited a range of mercury-in-steel thermometers, including distant reading and rigid stem models, with 4-in., 6-in. or 8-in. dials, wall or panel mounted. New-styled indicator cases were on view, and designs for special applications in industry were available, including diesel engine exhaust gas thermometers with anti-vibration head. Mercury-in-steel pressure recorders of various types were shown, together with a wide range of vapour pressure thermometers for industrial purposes, and single and dual pen pressure, vacuum and compound recorders.

Cambridge Instrument Co., Ltd., showed examples of the latest types of instruments for measuring temperature, CO_2, draught and pressure, chemical engineering and other industrial data, together with a selection of the Company's wide range of electrical measuring instruments. For the measurement and control of temperature, instruments were shown suitable for almost every industrial requirement, from the simple and inexpensive 4-in. dial thermometers to thermo-electric and optical pyrometers for measuring, recording and controlling the highest furnace and kiln temperatures.



A Cambridge disappearing filament pyrometer.

Cinema-Television, Ltd., showed a wide range of equipment, including automatic frequency monitors, cathode ray tubes, C.K. dosimeters, flying-spot microscope, industrial electronic metal detector, microsecond counter chronometer, mutual and self-inductance bridge, phase correction units, photo-electric cells, regulated voltage packs, and visual valve tester. Most of these were linked with working demonstrations so that the instruments could be seen operating under normal use conditions.

Dawe Instruments, Ltd., exhibited, in addition to various acoustical instruments, the type 2006 multipoint inflammable gas monitor and the type 2106 direct-heating moisture meter, the latter being a compact battery-operated equipment designed primarily for moisture determinations on wood, whilst the former is an equipment specifically intended to provide a warning of the presence of inflammable vapour in restricted areas of oil tankers when these are taking on or discharging oil. The method used employs a pair of hot catalytic platinum filaments in a Wheatstone Bridge circuit. A small amount of gas gives an unbalance in this circuit and sounds an alarm. The type 1101 Ultrasonic thickness gauge which was shown is designed to measure the thickness of materials between approximately $\frac{1}{16}$ in. and 12 in., where only one side is accessible, as for instance on pipes, boilers, pressure vessels, ships' plates, etc. These non-destructive thickness tests can be carried out by semi-skilled operators. An accuracy of ±3 per cent. is guaranteed, but where surface finish is good an accuracy of ±1 per cent. is quite usual. The advantage of this instrument is not only that it constitutes a means of non-destructive thickness checking on 'impossible' jobs, such as pipe bends, but that chemical, boiler house and similar plant can be constantly checked without the need for stoppages and dismantling.

The Department of Scientific and Industrial Research offered many interesting exhibits, of which we can mention only a few. For example, the N.P.L. industrial radiometer, which measures radiation from sources such as domestic fires—sources of relatively high intensity which do not fluctuate rapidly. Simplicity and low cost had been aimed at rather than sensitivity and speed of response. Low cost is especially important where a number of radiometers are used in series to obtain an integrated radiation output. The simplicity of the design could be seen from the model on view, which also showed the aperture and shaping of the front component which provided a wide acceptance angle while avoiding inter-reflections of radiation on the sensitive area. Another item of interest was a calibrator for micro-flow gas meters. In this a synchronous motor drives a lead screw, which, taking the form of an internally screwed tube, tracks a nut within its bore. Attached to the nut is a long displacer which is thus lowered at a precise (but very small) speed, into a volume of oil contained in a jar situated beneath the driving mechanism. As the displacer enters the oil, it displaces a corresponding volume of the gas which forms the atmosphere above the oil, and thereafter transfers this at constant rate through the meter to be calibrated.

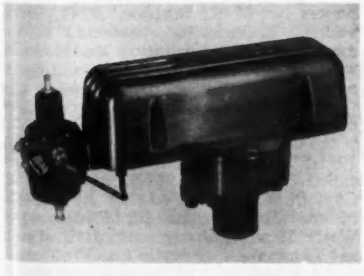
W. Edwards & Co. (London), Ltd., exhibited, among many other devices, a 'Speedivac' booster-vapour pump, model 9B3 which was the first of a new series and had a speed of 650 litres/sec., and was claimed to be effective at higher temperatures than the normal vapour pump with an effective speed prolonged up to 0.5 to 1.0 mm. of mercury. This was achieved with a heater loading of 2.25 kW and a backing pressure of 2-3 mm. of mercury. The vacuum switch controller, model VS.4, operated on a similar principle to the Pirani type gauge and provided for positive switching in and out at any required pressure values over the range 10.0 to 0.01 mm. of mercury. The instrument consisted of a control unit and a readily demountable gauge head. The Cartesian manostat, which was also shown, was a new and valuable

vacuum and pressure controller for research or industrial systems over the range 60 lb./sq.in. to 1 mm. of mercury. When the instrument is set the system is held at the required pressure automatically—a vacuum setting is retained even when the vacuum system is open to atmospheric pressure; on re-starting the pump the former vacuum condition will be restored without any other action. Pressure differential is of the order of 0·5 mm. of mercury.

Elcontrol, Ltd., exhibited some interesting infra-red sensitive equipment. The development of a lead sulphide cell has opened up many new possibilities in connection with electronic controllers for industry and as a first step Elcontrol are making use of it in connection with furnace safeguard and automatic ignition equipment for use with gas burners. The lead sulphide cell is highly sensitive to small variations in infra-red radiation and the modulated output thus produced is made use of to operate a relay unit giving control of gas valves, flame failure alarms, etc. Another exhibit was the photo-electric temperature controller, which is an on/off controller providing relay operation at a predetermined colour temperature and making use of a small photocell head provided with a focusing arrangement which is mounted to view the incandescent object. It is remotely connected to a separate control panel. Intended for a temperature range of 750 to 1,750°C., this unit is particularly suitable not only for temperature control of resistance butt welding, but also for the control of H.F. heaters, electric furnaces and other heat treatment devices.

The Electroflo Meters Co., Ltd., exhibited instruments for indicating, integrating, recording and controlling flow meters for all fluids; measurement and/or control of pressures, temperatures, level, density of ratio of all fluids; automatic control of power and processing plants; mechanical, electrical, pneumatic or electronic methods of measurement or control; remote, supervisory control and measurement; and panels, cubicles and centralised control schemes. The exhibit expressed the ability of the Company to undertake the complete instrumentation and/or automatic control of all types of industrial power and processing plants, and illustrated the unusually comprehensive nature of its services to this branch of engineering.

Elliott Bros. (London), Ltd., showed their 'Drimac' pneumatic transmitter, which is an entirely new instrument which converts a static pressure derived from a process variable (such as rate-of-flow, pressure, level or density) into a proportional pneumatic output. The



A 'Drimac' pneumatic transmitter by Elliott Bros. (London), Ltd.

transmitter operated on the force-balance principle which renders its accuracy virtually independent of a supply pressure and the pneumatic output, which is from 3 to 15 p.s.i. may be used for remote indication, recording or control. Robust construction and small overall dimensions are features of the transmitter which is available for operation from input pressures from 0.5 in. w.g. to 700 in. w.g. Also shown was gas analysis equipment, flowmeter and pressure recorders, pyrometers and thermometers, automatic controllers, apparatus for process control, etc.

The English Electric Co., Ltd., showed a range of instruments covering A.C. and D.C. flush and projecting mounting designs, both in square and round pattern cases, examples of house service pattern, singlephase and polyphase designs, as well as polyphase meters for switchboard mounting, protective relays, both triple pole and single pole units, as well as a gas actuated (Buchholz) relay for transformer protection. This apparatus was displayed on three panels. A small portable electronic insulating testing set, capable of providing up to 10,000 volts D.C. and giving a measurement of insulation up to 250,000 megohms was also shown. The output was continuously variable and non-lethal and the equipment was provided with a discharge amplifier, which gave audible warning of ionisation and incipient breakdown; the instrument was self-contained and operated from a standard A.C. supply.

Evershed & Vignoles, Ltd., showed a large graphic panel depicting a typical continuous process plant. The panel was arranged to be built flush with a wall, and forming in itself part of the wall. Miniature edgewise indicators and miniature chart recorders, operated by Evershed electronic repeater transmitters, were included in the diagram at appropriate points, and knobs for setting the proportional, integral and derivative actions of the Evershed three-term controller were also included on the actual diagram, though the controllers themselves were grouped together in a 'Nested' control cubicle which could be situated in an adjacent room. Displayed also on the Evershed stand were the various Evershed electronic repeater transmitters, all of which operated in conjunction with the process controllers, and included transmitters for level, flow, pressure, temperature and specific gravity. The level transmitters included float-operated and displacer-operated types, the latter being designed for detecting the liquid level or the interface between two liquids in a pressure vessel.

The Foster Instrument Co., Ltd., exhibited so wide a range of products that we can do no more than list them: Indicating controllers, electro-mechanical, electronic, and potentiometric electronic; circular scale self-balancing electronic indicators, electronic recorder, and circular chart galvanometer type recorder; strip chart electronic recorder; strip chart galvanometer type recorder; portable potentiometer and pyrometer tester; mirror type radiation pyrometer receiving tubes; thermocouples for general application; resistance thermometer elements for general application; magnetic amplifier for low range thermocouple and radiation pyrometer work, etc.

Foxboro-Yoxall, Ltd., exhibited a selection from their complete range of industrial control instruments comprising indicators, recorders, controllers and transmitters for temperature, pressure, vacuum, absolute pressure, flow, level, humidity, dewpoint, liquid density conductivity, *p*H, capacity, etc. The new model 53/58 Consotrol combined recorder and controller, which is small enough for graphic panel or console mounting, was exhibited in operation, controlling a demonstration process. This new development was shown mounted in console form together with the model 52 Consotrol indicating controller. In the model 40 series, various controller combinations were shown supported by selected measuring systems in section, and an example of the new high pressure helical. Dynalog electronic instruments were shown in conjunction with the roll surface temperature measuring element, the dewpoint measuring element, and the resistance bulb and thermocouple assembly. Another new development was the model 59 force balanced valve mounted controller which when used on liquid flow has no proportional, integral or derivative adjustment, together with the d/p cell, which is a recently-introduced method of measuring differential pressure by the force balanced transmission principle.

The General Electric Co., Ltd., displayed an interesting miniature A.C. link testing ammeter. An addition to the Company's existing range of link testing ammeters, which enable current in a circuit to be measured without breaking the electrical connections, this miniature model is intended for measuring a.c. currents up to 50 amp only. It comprises in effect a split core current transformer connected to a sensitive moving coil rectifier instrument scaled in amperes. The links are fully insulated for use on bare conductors up to 600 V. The split core current transformer consists of a pair of links, one fixed, the other hinged to enable the links to encircle the conductor under test. Three ranges (1 to 10 amp, 2.5 to 25 amp and 5 to 50 amp) are provided, the appropriate range being selected by a thumb-operated switch. The instrument measures 7 in. by 3 in. by 1¼ in. and weighs 1 lb. 1 oz. Among the other instruments on the stand was a new self-contained a.c. circuit analyser for measuring voltage, current, power and power factor simultaneously and a new link testing power factor meter. There were also demonstrations of link testing meters and of a magnetic sorting bridge for indicating physical and chemical differences in ferrous components and bar stock.

Honeywell-Brown, Ltd., exhibited indicating, recording and controlling 'Continuous balance' Electronik potentiometers. The response of the instruments demonstrated varied from two to thirty seconds for full-scale travel. Electr-o-pulse (time proportioning) and Air-o-Line (three term pneumatic) control forms were shown. Brown 'Differential Converter,' diaphragm type, pneumatic flow transmitters with associated miniature and conventional recording/controlling receivers, for all primary and process flows, were also shown, together with 'Protectoglo' combustion safeguard systems, single and multi-burner protection, and Honeywell electronic modulating, non-indicating, controls for space heating, air conditioning and low temperature industrial applications operating on continuous balance resistance bridge principle.

James A. Jobling & Co., Ltd., showed a selective range of 'Pyrex' brand laboratory and scientific glassware, including beakers and flasks, aspirators and desiccators, test tubes/tubing, general chemical apparatus, general purpose and vacuum stopcocks, interchangeable ground joints, graduated and volumetric ware, sintered filters, micro chemical

apparatus, special apparatus, and assembly apparatus.

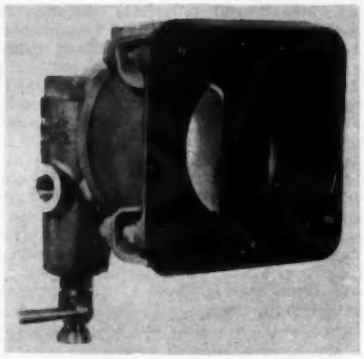
Kelvin & Hughes (Industrial), Ltd., displayed a range of instruments suitable for boilerhouses and temperature control in industry. Among these was a Lossmeter giving a reading of the heat loss in flue gases in boiler plants, this being achieved by a visual integration of the CO_2 content and the temperature of the gases, while separate scales on the same instrument read unburnt, burnt gases and temperature. A new type of gas analyser primary unit incorporating a newly designed water aspirator of an alternative model based on the Venturi principle, was also shown. Exhibits also included flowmeters, together with new circular chart pressure recorders. These instruments together with a new range of circular chart recorders operate on the mercurial manometer principle. Electric integrators can be fitted to both types of instrument and 10-in. diameter dial indicators can be provided. Circular chart recorders can be fitted with two pens if required for combing the measurement of flow with that of temperature or pressure.

George Kent, Ltd., exhibited for the first time new developments in industrial instrumentation and control including the Sigma-Kent controlling calorimeters, oxygen analyser with recorder, a new Kent flow meter of the mercury 'U' tube type, improved water meters for domestic and industrial use, and displays showing new auxiliary equipment for the Mark 20 controller, including, summating, averaging, biasing, integrating and differential pneumatic relays. Other impressive items included a modern power station control panel, a complete steelworks automatic control panel, a working model of the universal glass electrode *p*H Recorder, and a demonstration of the cascade control method of regulating steam temperature.

Murex, Ltd., showed Sincomax sintered permanent magnets for instrument manufacture. These magnets are formed as an integral unit with the soft iron pole pieces sintered in conjunction with the isotropic or anisotropic magnetic material of the Alnico or Alcomax type; they are being used in considerable quantities in the instrument industry. Also shown were sintered Alnico and Alcomax magnets for use in many applications in the electrical and allied industries. Pure tungsten, molybdenum, tantalum and zirconium in the form of rod, sheet, wire and fabricated parts was displayed; these metals are used in the lamp and valve industries. Tantalum and zirconium by virtue of their high resistance to corrosion find many applications, both in the chemical industry and also in the manufacture of instruments, which are likely to be subjected to corrosive conditions.

Nash & Thompson, Ltd., showed a selection of standard instruments and also special instruments designed and made to customers' requirements. They are particularly interested in this 'tailor-made' service on instruments which produce equipment, not elsewhere available, to suit special applications. The standard instruments exhibited included the metallurgical mounting press, paint thickness meter, glossmeter, paint abrasion machine, flow control switches, cycling switch, mains pressure tester, aeration test burner, flowmeter, rainfall detector and electrical impulse recorder. Anthracene crystals and phosphors for use with scintillation counters were also shown. Among the special instruments developed and made to customers' specification were the ventilation network calculator and the Bowles viscometer.

Rotameter Manufacturing Co., Ltd., exhibited an interesting range of 'Rotameter' flowmeters for gases and liquids. Representative examples were shown from the wide range of instruments now being manufactured. Working demonstrations included were electrical and pneumatic transmitting 'Rotameters' for remote indicating, recording and flow ratio control equipment, and the new 'Metric Series Rotameters' with interchangeable tubes and floats were featured.



The new 'Pneumerstat' introduced by Williams & James (Engineers), Ltd.

Sunvic Controls, Ltd., showed a complete range of Sunvic pneumatic and electrical instruments for the control and measurement of temperature, flow, specific gravity, pressure and liquid level in science and industry. Working demonstrations were a strong feature of the exhibit. A model test set showed the performance of a 'Nullmatic' pressure regulator under conditions of variation of upstream pressure and load, independently or simultaneously; while the performance of a 'Nullmatic' flow control system, together with that of the controller itself, under extreme conditions of temperature, was demonstrated. Scientific instruments were covered by demonstrations of hotwire vacuum switch relays, thermostats and energy regulators depicting typical applications in a laboratory, and a high speed potentiometric electric recorder, recording 16 points simultaneously on one instrument. A new range of electronic counters and scalers for experimental and industrial counting was also on view, together with a complete new range of vacuum measuring instruments.

Tinsley (Industrial Instruments), Ltd., exhibited a full range of Tinsley/Askania controllers of the latest design using a vertical jet pipe, for the control of temperature, pressure, flow and ratio. The central exhibit illustrated the automatic control of open hearth furnaces, and a large schematic diagram showed the various fuel, steam and air supply mains to the furnace, and the relevant controllers and ancillaries were displayed and linked to the diagram, thus illustrating how the automatic control is achieved. An automatic reversal unit was also shown. Also on display was a new flow transmitter and a new pressure transmitter, together with pyrometers of various types.

Walker, Crosweller & Co., Ltd., exhibited improved pressure and vacuum recorders, model 1600, features of which include horizontal chart movement, wide chart view, and automatic chart pick-up. Ranges (low and high pressure) 0.3 in. water gauge upwards for governor, producer and fuel gas pressures, gas distribution mains, steel furnaces, boiler houses, kilns, processes, research. Arkon gas and air flow recorders, model 1601, for gas distribution mains, producer gas, blast furnaces and coke oven gas, gas to kilns, ovens, heat treatment plant were also shown. Other exhibits included Arkon hydrostatic pressure and vacuum recorders, range 0.6 in. water gauge to 6 in. water gauge, and a selection of Arkon portable sensitive draught and pressure indicators, vertical column gauges, inclined gauges, etc.

Williams & James (Engineers), Ltd., displayed a unit showing the operation of air pressure regulators, a display unit introducing the Pneumerstat, this being an instrument combining the duties of a pressure reducing valve, flow control valve and bubbler chamber, and a selection from the range of automatic air compressor plants designed for the instrument industry, including the 'Oil-Free' compressor introduced at the previous exhibition. A selection of the Company's new range of compressors, for capacities up to 180 cu. ft. per minute, was shown, with a three-stage compressor plant for 2,000 lb. per sq. in. pressure, and pressure reducing valves, pressure relief valves, and other pneumatic accessories.

Wright, Alexander & Co., Ltd., exhibited new designs of pressure and vacuum recorders and indicators known as the 'Abbey' series. The casings were fabricated from black polished laminated bakelite and duralumin corner mouldings to form a strong and corrosion-proof housing of pleasing appearance. All fittings of vent cock, needle valve and zero-adjuster were housed within the case, and an external connection was provided. The exhibit displayed panel assemblies of recording and indicating units, including vertical-edgewise scale models, and individual instruments for portable or bench use, in a variety of ranges. New forms of chart and chart drive, by spring-wound clock or synchronous motor, were shown. Other of the firm's manufactures shown included laboratory gas and air meters, gas calorimeters and solid fuel calorimeters, manometers, and a spherical photometric integrator.

The Institution of Gas Engineers has now published the discussions on the papers by W. R. Branson, R. G. Warr, and E. T. Pickering, presented at the meeting of the Institution on May 28, 1952; also the paper by F. G. Pyper at a joint meeting of the Institution and the Coke Oven Managers' Association on October 29, 1952, and the 13th report of the Chairmen's Technical Committee—1951-52; the 29th report of the Gas Education Committee—1951-52; the paper by Captain W. Gregson on the 'Application of the Gas Turbine for Recovery of Waste Heat;' the paper by J. E. Davis on 'Thermal Efficiency in Gas Production and Utilisation,' and the paper by W. G. Gooderham and F. E. Mills on 'Some Effects of Traces of Iron Carbonyl in Gas,' given at the Autumn Research Meeting of the Institution on November 26, 1952.

Eastern Section, Institution of Gas Engineers

THE OPERATION OF DEEP PURIFIERS

by **R. WHITING,**

Divisional Engineer, Ipswich Division
Eastern Gas Board

THERE is a demand on gasworks with outputs of 6 mill. cu.ft. per day or less for purifying plant which is not met by tower purifiers, but which might well be satisfied by the deep purifier. The deep purifier is, in effect, two purifiers in one and it is only in this light that it can be considered seriously. This form of construction is economical in capital expenditure, saves ground space and, correspondingly, saves cost in housing. The more compact arrangement of the plant has an effect on operating conditions which is generally regarded as beneficial. At the moment, there is still a place for box purifiers, particularly in small and medium sized works and the deep purifier will provide an attractive and economical form of this kind of plant.

Costs and Designs

In assessing the capacity of purifier installations, the gas engineer is presented with a variety of formulæ which give startlingly different results. The overwhelmingly significant factor in such calculations is the cross-sectional area offered to the path of the gas. Thus, in the author's opinion, the crude rule that 0.4 sq.ft. of area should be allowed in each box per 1,000 cu.ft. purified per day was as satisfactory as any until recently. This implied a conventional set of five boxes each having between 2 ft. 6 in. and 3 ft. 6 in. of oxide in them. This would offer an 'R' ratio between 42 and 30.

This opinion is based on the fact that there seem to be firmly established 'conventional' figures for permissible pressure at the outlet of exhausters, usually having a maximum value of 60 in. w.g., and that any substantial increase in depth of oxide will render operation uneconomical, as 'back pressure' will become the controlling factor in oxide changing. It follows that if deep boxes are to give an increased capacity in comparison with conventional boxes occupying similar ground area they must be provided with suitable valves and connections to enable each box to act as two boxes in one, the gas entering the middle of the box and leaving at the top and bottom, or vice versa. This will call for careful planning of the gas-ways and connections.

The most important constructional feature of deep purifiers will be the design of the sides to resist the bending moment due to the pressure of the gas acting on the considerable span between top and bottom. This is done by the inclusion of specially cast vertical booms in cast iron boxes or by the inclusion of suitable rolled steel members in the sides of steel boxes. The design of a deep box is otherwise conventional, the bottom plates being supported on a prepared 'table' which may be of concrete or steel and the covers being attached to a more or less rigid framework made by the top balconies. As the bottom has little or no resistance to bending, it is assumed that the upward thrust on the top which is transmitted to the sides and balcony standards must be balanced in large measure by the weight of the box itself and, during normal operation, by the weight of oxide, grids, and bearers. When a box is put under pressure for testing before filling with oxide, some undesigned stress may be imposed on the box.

The use of steel as against cast iron has added advantages when building deep purifiers, particularly in meeting the bending strains in the sides, and generally the welded steel boxes themselves can be constructed some 20% more cheaply than in cast iron. Nevertheless, cast iron construction seems to predominate still on account of its resistance to corrosion. A set of cast iron boxes my be expected to last some 50 years, while a life of only about 20 years can be expected from steel purifiers. Reinforced concrete has been used for box purifiers, and many of the earlier disadvantages of this kind of construction have been overcome. Although concrete tower purifiers are under construction, the writer has no knowledge of any deep purifiers being so constructed. In some ways, this would be a very suitable medium as the additional bending stresses could be easily provided for in the reinforcement design.

The general arrangements of a purifier installation will have a great effect on the capital cost of an installation and before any comparison can be drawn in this respect between different types of purification plant, it may be relevant to consider the various forms of arrangement which can be used with box purifiers.

These types can be classified generally as follows:—(1) Boxes at ground level using hand labour and mobile conveyors, etc.; (2) elevated boxes with built-in mechanical handling plant feeding direct from ground storage to box; and (3) elevated boxes with oxide floor overhead. An additional variation lies in the fact that these classes of plant can be either completely exposed or housed in to a greater or lesser degree. Class 1 offers the lowest capital costs both in plant and foundations, but will give rise to high handling costs. If partly sunk in the earth and protected with a roof fairly good operational characteristics should be shown. Class 2 gives a higher capital cost and, if suitably designed, probably the lowest handling costs of any type of box purifier. It is difficult to house this class and unless some protection or lagging is given it is liable to give very poor operational characteristics. Class 3 implies capital costs higher than in Class 2, and handling costs will be higher than in the previous case, but lower than with ground-level boxes. This design is adopted when there is a shortage of ground space or where speed is necessary in changing oxide. As with Class 2 boxes, the temperature control will be poor unless the plant is housed or otherwise protected from the weather.

In designing purification plant for a medium sized works, it is desirable to have more than one stream of medium sized purifiers rather than one set of large boxes. This will increase capital charges per unit of gas purified, but will smooth out the heavy and uneven demand on labour resources made by changing of purifiers. In the ideal arrangement it is possible thus to keep a comparatively small gang continuously employed on purification instead of making intermittent demands for a large gang on the works labour pool. On this argument, it would seem desirable to have purification units to deal with about

3 mill. cu.ft. per day, but, as this would be a small unit for deep purifiers, a capacity of 4 mill. cu.ft. per day might be considered as a minimum. Purifiers should never be installed in small numbers, but as full rotational sets of five boxes, and catch boxes, as such, should not be included.

Considering purification plant for 4 mill. cu.ft. per day of coal gas (having up to 800 grns./100 cu.ft. H_2S) some indication of capital costs is given in the following table:—

	Cost per mill./day
Normal boxes at ground level	£14,500
Normal boxes elevated and provided with mechanical handling plant	£21,200
Deep boxes, elevated and provided with mechanical handling plant	£21,700
Normal boxes, elevated and with oxide floor above and elevator	£28,000*
Deep boxes, elevated and with oxide floor above and elevator	£28,500*

* Housed

Tower purifiers have not been constructed for small throughputs, but comparative capital costs for 6/8 mill. cu.ft. per day unit compared with deep boxes (elevated and with mechanical handling) would be roughly: Tower purifier, £22,700 per mill./day; deep boxes, £21,100 per mill./day (both excluding foundation).

Saving of ground space has been quoted as a point in favour of deep boxes, so figures are given showing the area required by different types of plant:—

	Ground space in sq. ft. per mill./day
Shallow boxes	2,000 to 2,500
Deep boxes	1,200 to 1,400
Tower purifiers	1,200 to 1,400

There is no saving of ground space between tower purifiers and deep boxes. This is due to the fact that the towers must have additional ground devoted to oxide handling and the filling of the containers.

Ipswich Installations

The purification plant at the Ipswich works will consist of two sets of deep purifiers, one of 6 mill. cu.ft. per day capacity and one of 4 mill. cu.ft. per day, the latter being under construction. The gasworks occupies a site of about five acres and the present maximum day's output is 7 mill. cu.ft. This is a high output per acre to achieve, but it is planned to expand this works to a capacity of 10 mill. cu.ft. per day or over; therefore it will be appreciated that ground space is at a premium. The choice of deep purifiers having overhead oxide floors was made fairly obvious by these conditions.

With a restricted site for a gasworks, the question of nuisance to the surrounding properties must be considered and, at Ipswich, such neighbours include granaries and maltings so it is of first class importance to ensure that the dust nuisance is reduced to a minimum. With this in view, the complete housing of the purifiers was considered, bearing in mind the added advantage of good working conditions for the men and improved control of temperature during operation.

This housing was adopted both by the former company for the original installations and by the Eastern Gas Board for the 4 mill. set. Designs were prepared for a reinforced concrete structure providing support for the purifier boxes integrally with the house framing and clothed with 4 in. reinforced concrete panelling. The roofs are also of concrete. A high standard of natural lighting is provided by large steel framed windows in the panels. The elevation generally is strictly functional, but not displeasing. It was approved by the Town and Country Planning Authority in the case of the second installation.

The structures are carried on piles, Franki piles being used for the original 6 mill. cu.ft. installation, while bored piles were used for the second (Pressure Piling Co.) to avoid any risk of damage to the existing adjacent structure by vibration. The boxes are of cast iron, selected on the grounds that with only one or two purification streams and with such a congested site, it might prove a major catastrophe to be faced with the complete replacement of a set after 15 to 20 years. The detailed design was worked out by the main contractors (C. & W. Walker, Ltd.) and includes massive cast iron booms, such as have already been described, to stiffen the sides.

There are five boxes in each set built in a continuous line, the nominal dimensions of the original boxes being 40 ft. by 24 ft. by 13 ft. 6 in., while the smaller ones are 24 ft. by 30 ft. by 10 ft. In both cases all five boxes are linked up for rotation and there are no catch boxes as such. The valving arrangements might be described as lavish on these installations, yet the expenditure has been justified in that the flexibility gained has enabled us to obtain greater throughputs and better results than we could have achieved without them.

The normal reversing valves are 'Milbourne' patent double faced valves and, in addition, there are water sealing U-pipes which can be flooded as an additional precaution when a box is off for oxide changing. This was felt to be desirable specifically on account of the depth of boxes and for the safety of men working in them. Inlet and outlet mains are connected to each box by manifolds containing three disc valves by means of which the gas can be caused to take any desired path through the oxide layers, either splitting the flow or passing right through the whole depth.

Again, from the point of view of safety, it was considered essential to provide for purging with inert gas for purifiers of such a depth in an enclosed building and indeed we have had reason to be very glad that we did so. The effects of a recent oxide fire in this plant might have been serious if gas had been present; as it was, no one was injured.

It was decided to use compressed CO_2 in cylinders and a system of cast iron pipes and valves was included in the original layout for purging purposes. A steam-heated manifold was designed and constructed at our works to accommodate six cylinders at a time. Some 40 28-lb. bottles of CO_2 are used to purge each large box.

Centralised instrumentation was considered to be of sufficient advantage to outweigh the difficulties and possible inaccuracies encountered with long capillaries and pressure pipes. A panel was designed and constructed by the works staff using mercury-in-steel indicating dial thermometers for each box and one similar recorder for the inlet main temperature, together with a battery of 'edge-scale' pressure indicators. To avoid loss of working time in the winter, some form of lighting is necessary and with deep boxes enclosed in a building it becomes practically essential. The installation for the 6 mill. cu.ft. per day set was carried out by our works staff using Benjamin flameproof fittings. To get adequate lighting into the deep boxes without excessive expenditure presented quite a problem.

The prepared oxide is handled on to the top floors by means of two travelling electric hoists and tipping skips each holding about two tons of oxide. This simple arrangement avoids any of the difficulties experienced in handling wet bog ore on elevators, conveyors, etc., and is reasonable in operating costs. Both installations are provided with indirect gas heaters and self-sealing safety seals vented above roof level.

It might be concluded that these installations are extravagant in design, but we have obtained the added benefit of increased throughput and have successfully purified 7 mill. cu.ft. per day through the set, already highly rated at 6 mill. cu.ft. per day. The cost of the first installation was in round figures £65,000 in 1945/46 which we estimate would imply an expenditure of £170,000 today. It is estimated that the smaller installation will have cost £110,000 on completion this year.

Operation of the Purifiers

During the seven years of working with the original 6 mill. cu.ft. set of boxes, we have dealt with the whole of the gas output of the works which has included varying proportions of water gas. The following values for H_2S concentration in the coal gas have been obtained.

	1946	1947	1948	1949	1950	1951	1952
Mean H_2S (grains per 100 cu. ft.)	650	620	680	670	720	860	850

It is of interest to compare these figures with yearly average ash contents of the coals carbonised.

	1946	1947	1948	1949	1950	1951	1952
Ash (%)	5.9	6.5	6.3	6.1	7.4	8.8	8.4

It would seem that there is some relationship between

the ash in coal and the H_2S in gas, both having increased substantially in recent years. Operating results show that generally the oxide is worked up to a saleable sulphur content in one fouling. In the early stages, the batches of oxide were prepared from mixtures of bog ore and partially spent oxide, of which there was a large stock. Later the system was made self supporting by mixing back the fines discharged from the boxes with the new bog ore. This has an added advantage in that the lumps discharged generally have a higher sulphur content and, therefore, an improved price is obtained for the spent oxide left for sale.

Hardening of Oxide

This policy implies that batches of oxide must serve a very long life. Lives of over 1,000 mill. cu.ft. of gas were recorded in the earlier period of operation, although the figure has been stabilised at about 750 mill cu.ft. now. This is, of course, in some measure due to the rising H_2S concentration already referred to. This long life gave rise at first to excessive hardening of the oxide and the getting of the spent material was an expensive and arduous business. Fortunately, Ipswich was one of the works selected by the Gas Research Board at which to carry out investigations into the hardening of oxide in purifiers and we were able to benefit from the experiments and from the advice of Dr. Moignard. The problem was largely overcome by careful preparation of the oxide to a definite bulk density and water content and by taking precautions during filling and levelling to prevent compacting. The bulk density aimed at is 25 lb. per cu.ft. on the dry sulphur-free basis and is obtained by mixing wood shavings or peat moss litter with the bog ore and semi-spent oxide. A moisture content of about 30% is achieved by applying water assisted by a suitable wetting agent.

Dr. Moignard, in his report to the Institution of Gas Engineers at the last research meeting, suggests that it may be better to operate the oxide batches with shorter lives using a greater number of foulings to reduce hardening and make possible an increased throughput. He argues that this can be done with financial advantage but after serious consideration at Ipswich we have retained the single-stage fouling. To put each batch through the purifiers twice would unquestionably double handling costs from under the boxes and in hoisting to the top floor. The oxide would be disintegrated twice instead of once, but would be easier to break up. The digging out of the oxide would presumably be less arduous and any saving to be offset against this doubling of costs would have to be made by reducing the piecework price for this work. It was fairly obvious that such a change must result in increased labour costs.

The boxes were designed so that the oxide could be arranged in up to six layers and after experiment we have adopted the practice of using four, two above and two below the middle gas connection. Two layers are 1 ft. 6 in. deep and two are 2 ft. 3 in. deep. The obvious alternative of using just two heavy layers was considered but was not adopted in the first place on account of the excessive hardening of the oxide which was more easily removed in thinner layers. Although the situation has been improved considerably it is still felt that the advantage of digging out the oxide in these thinner layers outweighs the time and labour spent in handling the extra sets of grids.

Reduced Heat Dissipation

With deep purifiers the more compact form of construction reduces the dissipation of heat through walls and mains and conserves the heat of reaction liberated during the process. In most cases this is an advantage, although it is conceivable that, with the higher throughput aimed at to-day this might become an embarrassment and that steps might have to be taken to cool the gas between boxes.

The housing-in of the Ipswich purifiers gives additional advantages in temperature control, protecting the boxes alike from cold winds and strong sun and offsetting the effect of the daily change of condition from day-time to night. The first two boxes are consistently worked at temperatures of 90°F. and over and it is our opinion that such temperatures are essential to obtain the higher throughputs required.

The gas at the inlet main is preheated to temperatures of 70°/80°F. depending on time of year, etc., and this is achieved partly with an indirect heater and partly by the admission of saturated steam. This latter has been found necessary to reduce the drying of the oxide which is due in some measure to the fact that some difficulty is experienced in getting the last boxes to cool sufficiently. The congestion of the site prevents the placing of ground-level openings on all sides of the building so that, at times, ventilation is inadequate. This is an unusual and purely local difficulty.

For a considerable part of the period under review it was customary to work with a comparatively high ammonia 'slip' at the inlet to the boxes, say, 25 grains per 100 cu.ft. and difficulties were encountered whenever this figure was allowed to drop. Recently, however, experiments have been made successfully in working with a reduced ammonia concentration in the crude gas and the purifiers are operating with only 10 grns. per 100 cu.ft. at the inlet. When preparing new batches of oxide a small amount of lime is added to the mixture in order to bring the *p*H value to about seven. The purifiers are rotated every two or three days.

The procedure for shutting off a box for oxide changing is substantially as laid down in the Safety Recommendations of the Institution of Gas Engineers. The box is moved to the position of 'last-taker' 24 hours before it is shut off. After shutting off, flooding the water valves, releasing the gas pressure and testing, the box is purged with carbon dioxide, using 40 cylinders, which is equivalent to about 10,000 cu.ft. This has been found to give a CO_2 content at the blow-off in the covers of over 90%. The next morning the bottom discharge chutes are opened and work starts on removing the spent oxide and refilling with the batch already prepared on the top floor. This part of the work takes about 24 working hours so that the boxes cannot be rotated for a total period of five days, when a box is changed.

Tools of non-sparking metal are used in getting out the oxide, while the usual canvas oxide chutes are used in refilling, the bed being levelled with wooden rakes. The fresh box is brought back into the stream in the usual manner. Sixteen men are engaged in the piecework oxide changing and it is estimated that about 200 tons of new oxide are put in while nearly 240 tons are discharged.

Piece-work Labour

Practically all the labour in connection with purification at Ipswich has been organised on a piecework basis with undoubted benefit to both the workers and the Board. A price is paid for emptying a box on the basis of 16 men being engaged and, similarly, another for re-filling. These prices cover:—

Discharging—Digging out oxide, removing grids and bearers, cleaning out bottom of box, dismantling and cleaning cast iron discharge sections.

Filling—Replacing bearers, grids and discharge chutes, and filling with oxide and levelling.

By long-established custom, the pieceworkers receive one hour's 'day-work' each for replacing covers.

Another price is paid on a tonnage basis for 'preparing, hoisting and placing' oxide on the top floor of the installation. Five men are engaged on this work, together with a mechanical shovel and driver. A 200-ton batch of oxide is prepared and placed on the top floor in two working days. An additional 3d. per ton is allowed with No. 5 box to compensate for time taken in travelling the length of the house. As described earlier, a proportion of the fines of spent oxide is blended back into a new batch and a price has been agreed for forking out these fines on a tonnage basis. This operation is not applied to every batch.

As the oxide is discharged it is removed from under the box by a Chaseside shovel especially modified for the low headroom and two labourers assist in trimming up for two hours at the end of the 16 hours needed for this work. Except in the box itself and in the 'forking' mentioned, the oxide is never moved by hand, Chaseside

shovels being used very freely.

For many years, Ipswich works sent away its spent oxide oxide in lumps, as discharged, but today it is broken down to met the requirements of the mechanical burners of modern acid plants. This work is done with a Crone & Taylor disintegrator in conjunction with a mechanical feeder, the oxide being handled by mechanical shovels. An idea of present day costs of labour on this plant is given for a complete cycle of operations for one box.

Operation	Piecework	Day Work and Mechanical Handling
	£ s. d.	£ s. d.
Discharging and filling	99 12 0	5 18 0
Preparing and hoisting oxide	34 3 4	10 0 0
Handling oxide from under boxes	—	10 12 0
Forking out "Fines"	34 0 0	9 7 6
Disintegrating "Lumps"	—	12 0 0
TOTAL	167 15 4	47 17 6

or £215 for a box that has passed some 750 mill. cu.ft. in its life, or 0.069d. per 1,000 cu.ft. per box which, with five boxes, implies handling costs of 0.4d. per 1,000 cu.ft. or 0.077d. per therm.

The total recorded wages for purification during recent years is similar to this figure, although it includes various incidental labours of day-to-day operation. The rate of increase is influenced by various factors, including wage awards, increased concentration of H_2S in the gas, etc.

Wages—Purification at Ipswich

	1950/1	1951/2	1952/3
Pence per 1,000 cu. ft.	0.286	0.371	0.44
Pence per therm	0.06	0.08	0.1

The oxide used is entirely natural bog ore, a bonus being payable on spent oxide removed from the works based on its sulphur content. The cost of this is set out below.

Cost of Bog Ore

Year	Bog ore handled tons	Tons per million cu. ft.	Total cost of hire £	Cost in pence per thous. cu. ft.
*1950/51	791	0.48	988	0.143
*1951/52	1,313	0.80	1,641	0.240
*1952/53	1,313	0.79	1,641	0.237

*Board's financial year April 1 to March 31.

Hire of Oxide

The hire of the oxide which is shipped direct into Ipswich from Holland or Denmark is about 0.24d. per 1,000 cu.ft. or 0.05d. per therm. Against this charge can be offset the credits for spent oxide bonus which have varied during the past few years. During 1951-52 when sulphur was in greatest demand, these credits were equivalent to over 0.14d. per therm, but at the present moment it would only be possible to offset 0.23d. per 1,000 cu.ft., or 0.05d. per therm against the charge for material; in other words, the cost of the purifying material today is just covered by the credit for spent oxide.

The total cost of purification today therefore (excluding capital charges) is made up as follows.

Working costs of purification

	Pence per therm
Labour and mechanical handling	0.10
Oxide	0.05
Other materials (including CO_2, lime, etc.)	0.01
	0.16
Less credit for sulphur (say)	0.05
or	0.11

This figure is one which does not give much opportunity to alternative processes to show a saving on operating costs.

The capital cost of purification plant can be kept to a minimum by the use of very large units on large works, probably using tower purifiers, but on smaller works this may not be possible or acceptable. A new standard has been set for the operation of purifiers which demands throughputs nearly twice as high as those generally accepted for box purifiers in the past. This cannot be achieved with any and every installation. It is felt that deep purifiers make a considerable contribution towards reduction of capital cost and increased operating efficiency and that, in addition, there is a substantial saving of ground space where this is of importance.

DISCUSSION

Mr. W. A. Evetts (Watford) said oxide was about the only material used in gas-making which was man-handled today with pick and shovel, and it was only natural that they should attempt to eliminate that one operation which was arduous and often unpleasant but the industry had not yet found a satisfactory alternative to the box purifier or oxide of iron. The restricted site at Ipswich called for a type of construction which reduced ground space requirements to a minimum and Mr. Whiting had shown that elevated deep boxes fulfilled that requirement equally with tower purifiers. On all other counts there would appear to be little to choose between boxes of the normal depth either elevated or at ground level.

Based on capital cost only, the author had stated that normal boxes at ground level were two-thirds of the cost of elevated boxes. That did not agree with Watford figures; they found for similar capacities there was little difference in the cost of overhead deep boxes and conventional boxes at ground level. The high cost of housing purifiers and providing an elevated floor was brought out in the paper, and he believed that more than one undertaking had abandoned elevated oxide floors.

Uneven Distribution of Gas

In the Watford Division they had installed three sets of overhead boxes 10 ft. in depth, the first installation having been completed in 1940. The only difficulty encountered, and it had been a considerable nuisance at times, was the uneven distribution of gas between the upper and lower sections of the boxes. A greater volume of gas passed through the bottom section than the top, although the H_2S content was lower at the bottom than the top. It would appear that at Ipswich they had decided that boxes deeper than 10 ft. were not advisable, and he wondered what had led to that decision. He noticed that the 13 ft. 6 in. deep boxes had only a depth of 7 ft. 6 in. of oxide, leaving 6 ft. of free space. He thought there was no doubt that the success at Ipswich with these boxes was due as much to the careful preparation of the oxide as any other factor, but he would register a gentle protest to the author's claim that the oxide was worked up to a saleable sulphur content with one fouling. It was apparent that there was a considerable quantity of spent oxide mixed with new material and that the average sulphur content of the oxide filled into the boxes was in the region of 25%. That would normally be equivalent to one fouling of undiluted bog ore. It was also interesting to note that much of the apparent increase in sulphur was due to the great reduction in moisture content.

At Watford they were completing the erection of eight 30 ft. by 30 ft. by 7 ft. deep reinforced concrete overhead purifiers in two streams of four boxes complete with oxide handling equipment, and the cost was estimated to be, if anything, slightly less than for equivalent capacity in overhead boxes 10 ft. deep, in that case four boxes 40 ft. by 30 ft. by 10 ft.

The author was to be congratulated on fixing piece work rates for all operations involved. The cost he quoted of 0.11d. per therm for dry purification closely agreed with those at Watford, but they were achieving a similar figure on a works working on base load, where the boxes were at ground level and rather over-rated for the work they were doing, and where there was a regular system of changing in operation and the oxide was worked up to a saleable figure in three foulings.

A Contractor's Viewpoint

Mr. S. M. Milbourne (C. & W. Walker, Ltd.) said the economic minimum limiting capacity for an installation of tower purifiers appeared to be in the region of 8 mill. to 10 mill. cu.ft. per day. The economic maximum capacity for the ordinary shallow purifier might be a debatable point, but it was clear that for capacities of 4 mill. cu.ft. per day and over the amount of ground space taken up by shallow box purifiers became considerable. In the early days of tower purifiers great stress was laid on the saving in labour, but box purification had advanced a great deal in the last 15 years. Modern methods of handling the oxide in the purifiers had eliminated the old laborious systems, and the simplicity of the oxide handling plant described by Mr. Whiting was undoubtedly one of the most economical in the country, and was much to be preferred to elevators and conveyors, which were not only higher in capital cost but entailed considerable maintenance charges.

The theoretical considerations underlying the deep purifier

so far as the economics of construction were concerned were quite simple. A purifier of double, or nearly double, the conventional depth of the shallow box saved by comparison the materials and workmanship, including transport, on the whole of the bottom and balcony plating, and also the covers of one purifier. Gas valves and connections were also saved to the extent equal to those serving one box. Against this saving, however, was the cost of the stiffening booms for the sides and ends of the deep boxes, the cost of the three-way gas inlet and outlet valves, and the slight extra cost per ton for the erection of the installation.

A feature of the paper was that the author had shown that there was no saving in ground space between tower and deep purifiers. That fact, coupled with the saving of capital which, according to figures given in the paper, amounted to £12,800 for a purifying installation having a capacity of 8 mill. cu.ft. per day, established a very good case for the deep purifier. The labour costs of operating tower or other forms of purifiers could readily be compared with the detailed information given by Mr. Whiting, and as he had said, the costs on the Ipswich installation gave little opportunity for alternative methods to show a saving in operation.

The limited life of steel box purifiers, presumably of welded construction, was a deterrent to any engineer who might otherwise be impressed with the capital saving over cast iron purifiers. Perhaps the most important point there was that after a comparatively short period of usefulness it would seldom, if ever, be convenient to carry out a replacement of purification plant. With the gradual increase of gas output over the years, which was common to most undertakings, works engineers were generally concerned with extending their purification plant. If replacement of existing plant had also to be carried out one could well imagine the difficulty as well as the anxiety of the engineer in charge in keeping the process of purification going in such circumstances. Finally, he paid tribute to the pioneer work of Mr. Collins Garrard. It was he who decided to put in the first installation of deep box purifiers at Ipswich, utilising an existing purifier house and so saving ground space and capital costs. He accepted the responsibility for the decision to instal purifiers 13 ft. 6 in. deep. Time had shown that his convictions were well founded.

Stresses During Testing

Mr. E. H. Winch (Cambridge) referred first to the upward thrust on the purifier top and the undesigned stress which would probably be imposed on the box during testing under pressure after construction. Contractors at present installing deep purifiers at Cambridge had enquired whether they would accept a pressure test after filling with oxide, in order to avoid the necessity for adopting special measures to counteract the effect of abnormal stresses which would arise if the pressure test was applied to empty boxes. After consideration, they decided to test with the oxide in the boxes.

While he agreed with the author's apparent preference for cast iron, the figures for the relative life to be expected from cast iron and steel purifiers appeared to be rather low, especially for steel. There were cast iron purifiers in the Cambridge Division which were well over 50 years old and were still good for years. Although he had no experience of all-steel purifiers, steel lids on the same purifiers had only needed renewal after nearly 40 years continuous service. Mr. Whiting had not said whether the figures in his table of capital costs were inclusive of foundations, but they compared favourably with the cost of a 3.8 mill. cu.ft. per day installation of five 10 ft. deep cast iron purifiers now being erected at Cambridge, without an overhead revivifying floor, but with an additional ground level conveyor for ease in handling oxide. The present day cost of these, including foundations, was £27,600 per mill. cu.ft. In those purifiers, driven piles of the vibro cast-*in-situ* type, 45 ft. long, were used in spite of the fact that one line of piles was within 4 ft. of the existing purifier house which was built on mass concrete foundations in column form some 24 ft. deep and 6 ft. square.

Incorporation of indirect gas heaters in the Ipswich installation was interesting. At Cambridge they had found similar heaters not very effective, and they had not been used since about 1935. It was considered more important to retain the heat of the reaction and in their new installation this would be achieved by enclosing the boxes in a house open on one side and by lagging the underside of the purifier lids.

One was reminded by the author's details of purifier operation, how great were the differences in the conditions and modes of operation developed in different works. The relationship he had established between ash content and H_2S concentrations was interesting. Presumably the H_2S concentrations quoted were at inlet to purifiers, in which case it would be of interest to know how much H_2S was removed in the ammonia washing plant. Over the last two years the average ash content at Cambridge had averaged only 4.4% with a maximum of 6.3%. Average H_2S in coal gas at inlet to washing plant had been 800 grains, with a maximum of 1,020, of which about 180 grains had been removed in the ammonia washers, leaving an average of 620 grains at inlet to purifiers, with a maximum of 750. At Ipswich the oxide was worked up to spent in one fouling; at Cambridge they averaged four foulings from new to spent, purifying about 1,100 mill. cu. ft. per batch.

Despite the greater amount of handling, enforced by shortage of capacity, the net cost of purification per therm at Cambridge was only 0.13d. per therm compared with 0.11d. in the author's case. Cambridge appeared, however, to obtain a higher credit for spent oxide—0.09d. compared with 0.05d. per therm. The cost of labour and mechanical handling was 0.12d. per therm, compared with 0.10d., and new oxide cost 0.07d. compared with the author's 0.05d.

The author had made a good case for the deep purifier, particularly on the saving in ground space and the increased operating efficiency. There was also some saving in capital cost, especially if the purifiers were housed. He wondered whether Mr. Whiting felt there was still some scope left for reducing operating costs compared with the figures he had given, thereby strengthening the case still further.

Reliability of Box Purification

Mr. B. C. Morton (Robert Dempster & Sons, Ltd.) said that in spite of new types and designs such as initial scalping, liquid, towers, pelleted oxide, dynamic and pressurised, static boxes still had a large part to play and in general terms the engineer could still confidently rely on their performance. It was generally agreed that the principal objection to static boxes was the handling of the oxide, and not the type of purification. It resolved itself purely into a handling problem, which was an important point in favour of deep boxes. Naturally they were always on the lookout for improvements, and therefore they approached the consideration of deep boxes in the light of experience gained from shallow static boxes. Present day problems had been accentuated by the quality of coal now used and the high percentage of sulphur.

His company was interested in deep purifiers of 10 ft. and over 25 years ago and had installed 14 sets of an approximate total capacity of 54 mill. cu.ft. per day, and a recent order for the Eastern Gas Board now under construction was for Cambridge for five boxes 25 ft. by 25 ft. by 10 ft. deep with a capacity of about 4 mill. cu.ft. per day. The author's conception that deep purifiers were in effect two purifiers superimposed on one another was sound and necessary. It was essential to emphasise that in the proportioning of deep purifiers that factor was borne in mind.

The author had described the manner in which gas could be diverted through the oxide layers in any direction by means of three disc valves, but he had not told them whether he had had any difficulty in ensuring equal volumes of gas passing upwards and downwards when divided flow was employed. He had spoken of the care necessary in designing the side plates; the same care was essential for the top plates to ensure that the bursting pressure transmitted to the top of the side plates was resisted by an adequate girder construction of the top plates and the cross gangways in tension. In designing the purifier casings care had to be exercised to ensure that the upward pressure on the top plates was resisted by the internal stands and their attaching bolts. He had suggested that steel boxes had a life of only 20 years, and in another passage he had put it at from 15 to 20 years. That was a conservative figure, and a longer life should be anticipated.

Turning to capital costs, from numerous comparisons they had formed the conclusion that deep boxes, elevated, and provided with mechanical handling plant, worked out cheaper per mill. cu.ft. per day than normal boxes, elevated, and provided with mechanical handling plant. Double working capacity was obtained merely by adding approximately 5 ft. to the depth of the boxes and stiffening up the boxes somewhat, retaining the oxide plant essentially as before.

He endorsed Mr. Whiting's view that the best sequence was five or even six boxes without catches. The inclusion of catches, according to former practice, added to capital cost, which was virtually unremunerative. The catch boxes did not bear a fair share of the purifying load, which the same boxes would do if arranged in series. While recognising that Mr. Whiting had sought to judge fairly the comparative merits of different kinds of plant there was a background impression that he was unconsciously partial to purifiers within a house. With modern methods of insulation, which could be applied to bottom, sides, and top plates together with covers, the operating difficulties with an exposed plant were minimised. The case for a plant within a house then became merely a comparison between the capital cost and the advantage that could accrue from providing working cover. He (Mr. Morton) held the view that this additional capital cost

was not justified, apart from exceptional cases of amenities or congested site which required overhead revivifying floor.

On the further subject of insulating purifiers, it was not sufficient in his view to insulate the covers. Pronounced condensation was likely to occur beneath the top plates, soddening the oxide, in contrast with the dry oxide beneath the covers, and this caused unbalanced activity conditions in the oxide layers.

Mr. E. O. Rose (Tottenham) suggested that the paper might well have borne the title 'The Case for Taking Pains Over Purification.' He did not think Mr. Whiting had made any absolute case for deep purifiers, but he had rather shown that deep purifiers could function as well as any other type, and that at Ipswich he had done very well with them. One could only assess the working results by making comparisons with those from other installations, and a comparison between the Ipswich working and that at Tottenham showed two distinctly divergent tendencies which had a bearing on the question of capacity rating of purified boxes with which the author opened his paper.

Sulphur Content

The author had claimed that the oxide was worked up to saleable strength in one fouling. The tabulated results showed the sulphur content of the oxide going into the boxes to be anything up to 37%, or more generally something about 20% in the more recent working. This was due to the mixing of spent fines with the new oxide and therefore did not represent working up to full strength in one fouling. The capacity ratings of the two installations quoted in the paper were not quite consistent, but for the purpose of discussion he took the later 4 mill. cu.ft. per day installation, as its rating was the more conservative and presumably represented the author's most recent views. Counting a deep box as two boxes, which it was, a purifying area of 1,800 sq. ft. and an oxide volume of 6,750 cu.ft. had been allowed per mill. cu.ft. of gas per day. That was not inconsistent with the rating usually adopted by makers of tower purifiers, but he found that at Tottenham they allowed 25% more area and 50% more oxide capacity.

He realised that at Ipswich there was the special local condition of shortage of space, but it appeared that the difference in size of boxes provided in the two cases showed the difference between their two policies. Working of boxes at high capacity demanded the choice of the best oxides, special preparation of the oxide, and careful temperature control of the boxes. He thought the first installation at Ipswich, which was loaded to a greater extent than was intended for the second installation, was worked almost beyond its proper limit, and temperatures, at least locally, were on the high side, and the oxide tended to become acid. This was indicated by the extraordinary ammonia slip of 25 grains that was considered necessary and the fact that a fire did occur on emptying one of the boxes.

There was a natural tendency on the score of capital cost to keep an installation as small as possible, but he wondered whether they were overdoing it. In their installation at Tottenham the boxes with foundations, covers, and grids, represented 60% of the whole cost, the remaining 40% covering valves, connections, handling plant, and other items which were independent of the size of the box. By having 20% less area, as at Ipswich, only 12% of the capital cost had been saved. The fact of having more oxide in the boxes did not make the oxide handling cost any greater, as the total weight of oxide fouled was the same as for any given quantity of gas at a specified sulphur content.

Turning to purifier design, he agreed with the author that no works should be dependent on a single stream of purifiers. Apart from the advantage gained in organising labour for changing, experience seemed to show that better control could be obtained with smaller boxes. Warr and Pickering showed in their paper to the annual meeting of the Institution of Gas Engineers in 1952 that in the operation of tower purifiers it was noted that more sulphur was absorbed near the control inlet duct and near the outer walls than in those parts of the trays more remote from the cooling surfaces. There was a lot to be learnt about dissipation of the heat of reaction in purifier boxes and a further study of the subject would enable them considerably to improve their designs.

Why Not Concrete Boxes?

He wondered whether concrete construction had been considered at Ipswich, and if so why it was ruled out. Having gone to the expense of a concrete substructure, concrete framed building, and concrete overhead floor, they could have had concrete boxes as well for very little extra cost. He had taken out the cost of two streams of five 30 ft. by 30 ft. boxes, complete with handling plant, but without building or overhead floor, of the type recently completed at Tottenham, and the figure was £74,300. At the Ipswich rating these would purify 5 mill. cu.ft. a day and the cost would be £14,860 per mill. As the greater part of the work was done about a year ago, 10% must be added, making a present day cost of £16,350 per mill. This should be compared with Mr. Whiting's figures of £21,200 and £21,700 for normal and deep boxes respectively in cast iron without housings. Such an installation would have the advantage of providing two parallel streams instead of one stream. At the end of the paper Mr. Whiting had thrown out a challenge in the matter of costs. At Ponders End the net cost was 0.106d. per therm.

Mr. H. C. Dunbar (St. Albans) said that at St. Albans there were two four-box streams of deep purifiers, each box being 30 ft. by 30 ft. by 10 ft., and the rated capacity was 3.6 mill. cu.ft. per day. The boxes were operated split-flow with common inlets and top and bottom outlets. The oxide was arranged in four layers each 1 ft. 6 in. deep. Danish bog ore was at present being used, one box holding about 140 tons of new oxide. Boxes were changed after working 150-180 days, but they had worked longer for experimental purposes. Average gas purified per stream in 150 days was 360 mill. cu.ft., with an inlet H_2S content of 800-950 grains per 100 cu.ft.

An attempt had been made to discover whether there was any difference in the performance of the top and bottom halves of the boxes by testing for H_2S in samples from the outlet ducts as well as from the common outlet main. The average results expressed as grains of H_2S per 100 cu.ft. removed for 72 tests on first and second takers were:

	First taker	Second taker
Top outlet	429	178
Bottom outlet	384	152
Difference	10½%	14½%

Oxide analyses were made on each of the four layers of a number of boxes and it was found that on the average the sulphur content was slightly higher from the bottom two layers than from the top two. The two sets of results taken together indicated that more H_2S per unit volume of gas was removed in the top two layers but that more gas passed through the bottom two layers. Experiments were now being carried out by using two layers 3 ft. each top and bottom instead of the four layers of 1 ft. 6 in., but it was too early to form an opinion as to the advantages derived. Air was added at the rate of 3-3½% and the quantity recorded each hour. Ammonia in the inlet gas was kept as low as possible and was usually 0-1 grain per 100 cu.ft.

Live steam was used during the winter but very sparingly due to excessive condensation in boxes and mains. Steam preheaters were used to raise the inlet gas temperature to 90-100° F., but difficulty was experienced during cold weather in maintaining box temperatures as high as 70° F., due to their being in an exposed position.

The Author's Reply

Mr. Whiting, in a brief reply, said he had a preference for the housing of purifiers and he thought there were some benefits which could not be derived in any other way. They had had no difficulty in dividing the flow of gas; the boxes were worked almost continuously under the conditions he had described. Distributing valves which enabled them to ring the changes were used, but he did not attribute to them the success of working on split flow. In referring to the life of plant he had necessarily been very conservative, and he accepted the fact that cast iron might last for 90 years and steel purifiers might well last for longer than 20 years. It would be interesting to know for what length of life the contractors would be prepared to give an unconditional guarantee.

In the matter of cost it had been difficult to arrive at universal figures and he had given a slightly higher cost for deep purifiers due to the greater amount of valve work and so on for a restricted type of construction. In a larger installation the figures would show a lower capital cost per mill. cu.ft. He thought they had all benefited enormously by the research work carried out by Dr. Moignard and his fellow workers. On the operational side on the matter of working up the oxide in one fouling, he had worked on the assumption that it was not wise to use bog ore unblended and as received in a purifier. Therefore, there was necessarily a percentage of fine spent oxide blended back.

Mr. D. B. Parkinson, proposing a vote of thanks to the author, said one of the outcomes of the reorganisation of the gas industry under nationalisation was that they found themselves working with new colleagues, and they had been particularly fortunate in that respect in the Eastern area. He had formerly shared with Mr. Whiting the privilege of serving under Mr. Grogono, a past President of the former Eastern Association. Whether they were converted to the deep purifier or still preferred to sit on the fence there was no division of opinion about Mr. Whiting having put his case in a masterly fashion.

Mr. K. C. Rees seconded the vote of thanks and agreed that the gas industry must not be content with former standards but must ever be concerned with improving its efficiency.

Abstract of I.G.E. Communication No. 429

THE 'MANCHESTER' PLANT

LIQUID PURIFICATION IN OPERATION AT LINACRE

TOWARDS the end of 1947, the oxide boxes on the horizontal coal gas stream at the Linacre works of the then Liverpool Gas Company were working to capacity, and the position was aggravated by structural damage to the largest set arising from enemy action. It was necessary that some additional purification capacity be installed within a reasonable time. It was natural, therefore, that liquid purification processes should come under review. At that time, there was also the possibility of the installation of a completely new carbonising plant of upwards of 10 mill. cu. ft. per day at another works of the same undertaking. Following detailed consideration of the processes available, it was decided to install a liquid purification plant of the 'Manchester' type at the Linacre works, which, apart from easing the situation at this works, would enable further detailed information to be obtained regarding the process. This information would, in turn, be of value when the purification plant for the new carbonising installation came up for consideration.

This paper gives full details of the information that has been obtained from three and a half years of continuous operation of this plant at Linacre, which has a capacity of 3.5 mill. cu. ft. of horizontal coal gas per day. Operating details have been covered very fully, and this is justified by the paucity of information otherwise available on this subject. It is shown that, in certain circumstances, which arise not infrequently, a good case can be made for liquid purification. The costs tend to be rather higher than for oxide boxes, but this difference is by no means so great as is generally imagined. The process possesses several advantages, and these are covered fully in the paper. A completely new method of sulphur recovery is described, which results in the continuous production of sulphur of 90 to 95% purity. It is believed that, were this particular grade of sulphur available in any quantity, it would command a higher price than that obtained for the sulphur in spent oxide. This would be justified on the reduced transport charges alone. If liquid purification were accepted on a larger scale, this factor would be sufficient to allow the process to compete with oxide boxes from the financial point of view alone.

Towards the end of 1946, considerable progress had been made with the development of the pilot plant installed, by the Manchester Corporation Gas Department, at Droylesden, for the removal of hydrogen sulphide from fuel gases by washing with a suspension of ferric oxide in ammonia solution. The manufacturing rights of the process covered by B.P.S. 550, 272, 1941, were granted to several concerns, and a full-scale plant was erected at the Rochdale Road works of the Manchester Gas Department. The experience gained on the pilot and full scale plants was made available to the interested contracting firms, and it was established that the process was quite capable of washing gas, for the removal of hydrogen sulphide, to a degree comparable with oxide boxes. The development of this type of plant was the result of the increasingly arduous and uncongenial work being called for to empty the normal type of oxide boxes; in certain areas, considerable difficulty was experienced in obtaining labour for this purpose. The management of the then Liverpool Gas Company was particularly interested in this aspect of the subject, and considered that so far as possible this type of labour should be replaced by more congenial work. In these circumstances, therefore, the management at Liverpool kept closely in touch with these developments, and, early in 1947, approached W. C. Holmes and Co., Ltd., with a preliminary enquiry for a liquid purification plant of the 'Manchester' type to be erected at the Linacre works. It was fully appreciated that such a plant would be of an experimental nature, but it was intended to be of such a size that it would make a useful contribution to the purification plant, since at this works one set of oxide boxes was badly damaged by enemy action. It was, therefore, decided that a capacity similar to a medium sized installation of oxide boxes would be appropriate, and a tentative figure of 3 to 4 mill. cu. ft. per day was agreed upon. It was the intention to provide all reasonable facilities for the collection of experimental data, which would be particularly valuable in the design of further plants. The preliminary proposals were discussed in detail, and it was decided to proceed with the project towards the end of 1947. The erection of the plant was commenced in September, 1948, and completed by August of the following year. The plant was first put into operation in September, 1949.

by

L. G. Townsend,
M.Sc.(Lond.), M.Inst.Gas E., F.R.I.C.,
Deputy Chief Chemist,
Liverpool Group,
North Western Gas Board

Until recently, the plant had not been operated at its maximum throughput for any length of time, and for this reason, the costs are not representative. It is proposed, therefore, to give a full summary of costs for the year 1952, with experimental items removed from the expenditure. These are compared with the figures that would be obtained if the plant were worked regularly at a throughput of 3.5 mill. cu. ft. per day, which figure is comfortably within its capacity.

TABLE 1.—*Costs of Liquid Purification*

	Actual Costs for 52 weeks ended Dec. 28, 1952, with certain items of experimental work extracted (£)	Derived Costs at a Daily Throughput of 3.5 mill. cu. ft. per day (£)
1	2	3
Unloading and stocking new materials	37	50
Preparing solutions	308	308
Cost of reagents	1,431	1,976
Attendance on plant	953	953
,, ,, (sulphur recovery)	434	434
Cleaning out vessels	207	207
Routine mechanical and electrical attendance	60	60
Supervision	161	161
Cleaning	29	29
Sundries	264	264
Labour overheads	333	333
Works services (steam, water, electricity)	4,515	4,600
Repairs to plant	750	750
Painting	90	90
	9,572	10,215
Credit for sulphur recovered at £10 per ton	950 (only partial recovery)	4,050 (assuming full recovery and debiting steam for drying)
Net cost	8,622	6,165
Gas washed (mill. cu. ft.)	929	1,200
,, ,, (mill. therms)	5.109	6.600
NET COSTS:		
(*a*) Pence per therm	0.40	0.22
(*b*) ,, ,, 1,000 cu. ft.	2.22	1.23
(*c*) Pounds per ton sulphur removed from gas	21.6	11.9

The costs for oxide purification over the same period covered in col. 2, Table 1, assessed on the same basis amounted to 0.22d. per therm. The figures presented show that liquid purification tends to be more costly from the operating point of view alone. There is, however, a distinct advantage to the liquid process in respect of capital charges. The plant under discussion would cost in the region of £40,000 at the present time, and a set of oxide boxes of the same capacity would cost approximately twice this amount. At 7½% per annum the capital charges would, therefore, be 0.11d., and 0.22d., per therm, respectively. This figure is perhaps unduly in favour of the liquid plant, since the life of oxide boxes is generally far in excess of the 20 years usually assumed in the computation of capital charges. However that may be, the overall cost of liquid purification compares favourably with oxide boxes. It is stressed that the figures given in the 52 weeks summary are not at all favourable to liquid purification, since no credit is taken for the bulk of the sulphur recovered. On the other hand, provision for effluent disposal might cost a further 0.02d. per therm exclusive of capital charges. So far as is possible, account has also been taken of the overheads. It is for this reason that the figures given tend to be appreciably higher than those already given in the references quoted. It is probable that the operating costs actually obtained in a plant designed on the data now available would lie between the figures of 0.40d. and 0.22d. per therm, given above, and that there would be very little to choose between the overall costs of the two processes. If, as appears possible, a better price can be obtained for 95% sulphur, as against spent oxide, then the charges might well be in favour of the liquid process.

DISCUSSION

Mr. J. J. Priestley (W. C. Holmes and Co., Ltd.) suggested that it was appropriate to recall the days before the Linacre plant was installed, when the firm with which he was associated became interested in the 'Manchester' process, and the reason for that interest.

In 1945 work was being carried out at the gasworks at Mirfield on a full-scale Holmes-Maxted catalytic sulphur removal plant. It would be recalled that in this process the organic sulphur compounds in the gas were converted to hydrogen sulphide. At Mirfield a single catch box was available for this duty, but was found to be inadequate for continous operation, which required the removal of 10 to 15 grains of sulphur per 100 cu.ft. of gas. Duplication of the catch box was found to be impossible for various reasons, so a simple 'Manchester' plant was installed between the catalyst plant and the catch box. This was their first experience with the process. The combination proved to be quite satisfactory, the 'Manchester' plant reducing the hydrogen sulphide content from 15 to 2 grains per 100 cu. ft., which the catch box was able to handle.

This first simple plant was subsequently modified and extended to handle crude gas, but to achieve a partial purification only. Again, this was merely part of the experimental programme of investigating the catalytic sulphur removal process, because they wished to find out the effect of the presence of hydrogen sulphide on organic sulphur conversion. To do this the 'Manchester' plant was put on crude gas, the catalytic plant after it, the final purification being carried out in the main works purifiers. As a result of this work, they foresaw possibilities of a simple combination of the two new processes in which 'Manchester' gas washers would be placed before and after a catalytic plant, those before reducing the hydrogen sulphide to a low value, those after removing the residual hydrogen sulphide, together with that produced during catalysis. There was no correspondingly simple arrangement with oxide boxes which had to be 'rotated.'

Mirfield Pioneering

Development work was still in progress at Mirfield when they were invited to install a plant at Liverpool. This was agreed upon, the relatively scanty results obtained on the Mirfield 'Manchester' plant to date being used as a basis for the Liverpool design. From this point, development was carried out in parallel at the two locations.

Very soon afterwards, two other plants were installed, one at North Shields, the other at Ossett, both of which were designed to achieve partial purification only and ease the load on sets of existing box purifiers, which were working far beyond their designed capacity. Both plants had the desired effect in relieving the emergency.

In one respect at least liquid purification resembled dry-box purification in that both were relatively simple operations to perform but extremely difficult to understand. There was little to be learned from laboratory scale operation, and work must be done on a full scale. One encountered a great number of variables, most of which influenced each other, and it was to the credit of the author that he has unravelled many of the complexities of the process and presented them in so lucid a fashion.

Probably the most important factor for the successful operation of a 'Manchester' plant was the maintenance of an active condition of the circulating liquor, particularly in regard to alkalinity and 'active iron.' Experiments at Liverpool and at Mirfield had shown that even the physical dimensions of the gas washers were of secondary consideration to this.

Blues in the Liquor

He agreed with the author that the incidence of blues in the liquor was of great importance. When they were present it was likely that the major part of purification was achieved by oxidation and reduction of blues rather than the ferric oxide/sulphide reaction. The Liverpool experiences with water gas had a parallel in the plant at Ossett which was handling crude coke oven gas which contained traces only of hydrogen cyanide. No blues were formed and purification was correspondingly more difficult. Although the original patentees regarded the presence of blues as beneficial, he doubted if their great influence was fully appreciated.

Regarding continuity of operation, essential on a complete purification plant, schemes had been prepared to modify the Liverpool plant to achieve this. On plants of more recent design, the use of the countershaft has been abandoned, and all pumps and blowers fitted with individual motor drives. Each motor had two sources of current, firstly grid current, and secondly current provided by a diesel-driven generator set. In the event of a grid power failure, the diesel generator started automatically and fed current to the pump motors in a matter of seconds and continuity of operation was achieved.

The treatment of crude sulphur sludge had always been a problem of some considerable difficulty, and the lack of a sound method of treatment had been a drawback to the development of the process as a whole. The process described by the author was ingenious, making use of a peculiar property of sludge when heated, which he would say from experience was very similar to the coking process, except, of course, that the 'coke' was very fragile.

The use of film driers for drying raw sludge had to be abandoned, as the author stated, but apart from difficulties of distribution which he mentioned, one of the main troubles was the copious evolution of carbon dioxide on the drying rolls. The thin froth so formed would not stick on the rolls. Their more recent work at Gloucester had shown that film driers might be used quite successfully on sludge which had been boiled (*i.e.*, had the carbon dioxide removed), particularly if the liquor which separated on boiling was previously removed by simple decantation.

The author had pointed out that there was no call for air admission, but some 1% of carbon dioxide was removed from the gas. It would be interesting to hear views on the value of this reduction of inerts which could well amount to 3% or 4% of the gas volume.

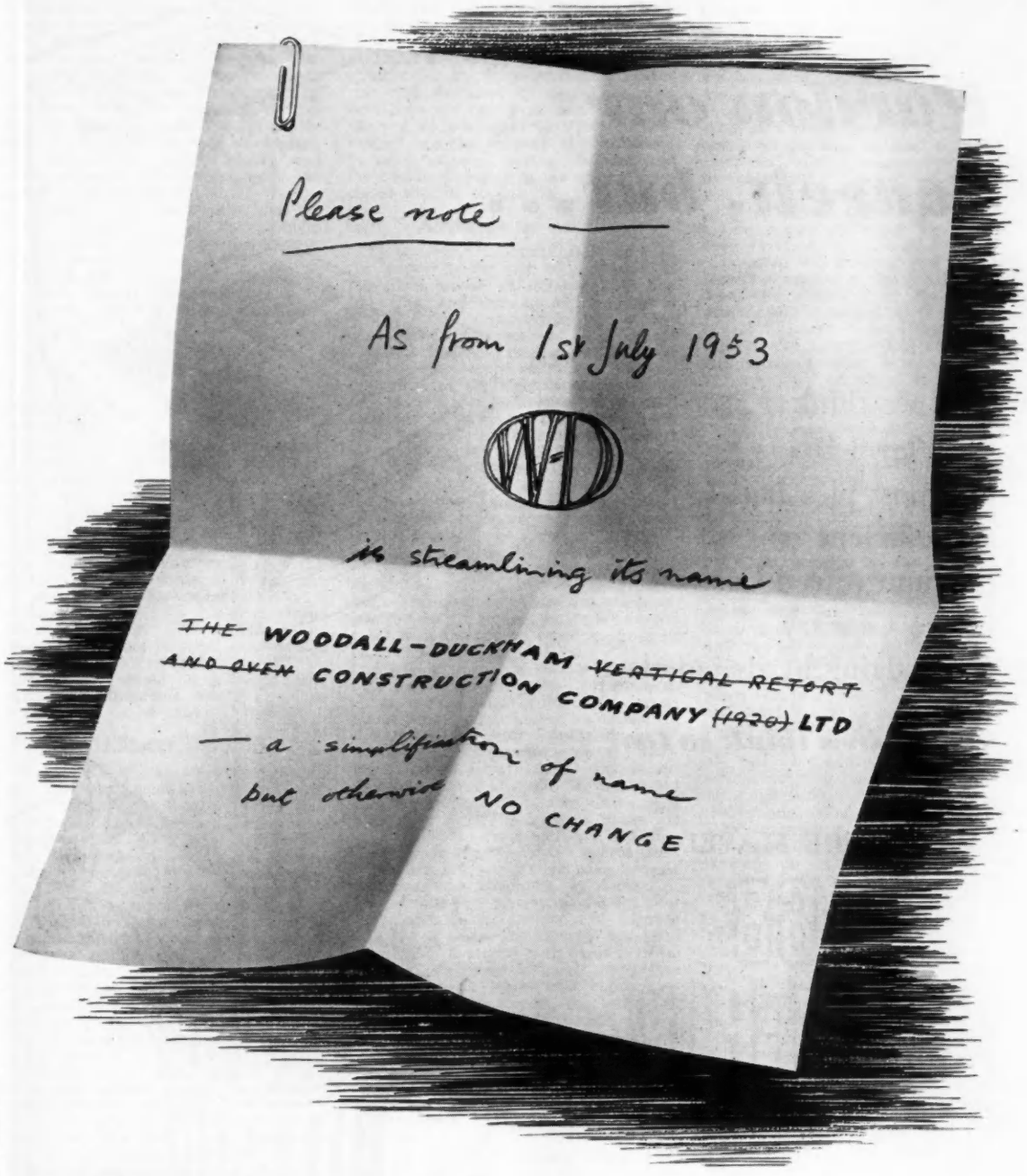
Further, because of the lower back pressure of the plant as contrasted with boxes, there was a saving in power at the exhausters. The value of 6 in. to 12 in. W.G. saving on exhausting might be 4% to 6% of the total derived costs given by the author.

Removal of HCN

Dr. A. Marsden, M.B.E. (Area Scientist, South Western Gas Board), said it should be borne clearly in mind that, when designing liquid purification plants of the 'Manchester' type, an important aspect of the matter was the amount of hydrocyanic acid in the gas to be purified. The reactions involved were complicated, and it was doubtful whether their course and sequence in this particular process were yet fully understood, but it was certain that a much longer reaction time was normally required for the purification of carburetted water gas, in which hydrocyanic acid was practically absent, as compared with coal gas, which might contain hydrocyanic acid to as much as 10% of the hydrogen sulphide present.

It should be made clear at this stage that when the order was placed for the Gloucester plant two conditions were accepted after careful examination of the information available at the time.

(*Continued on p. 163*)


Please note
As from 1st July 1953
its streamlining its name
~~THE~~ WOODALL-DUCKHAM ~~VERTICAL RETORT AND OVEN~~ CONSTRUCTION COMPANY ~~(1920)~~ LTD
— a simplification of name
but otherwise NO CHANGE

WOODALL - DUCKHAM

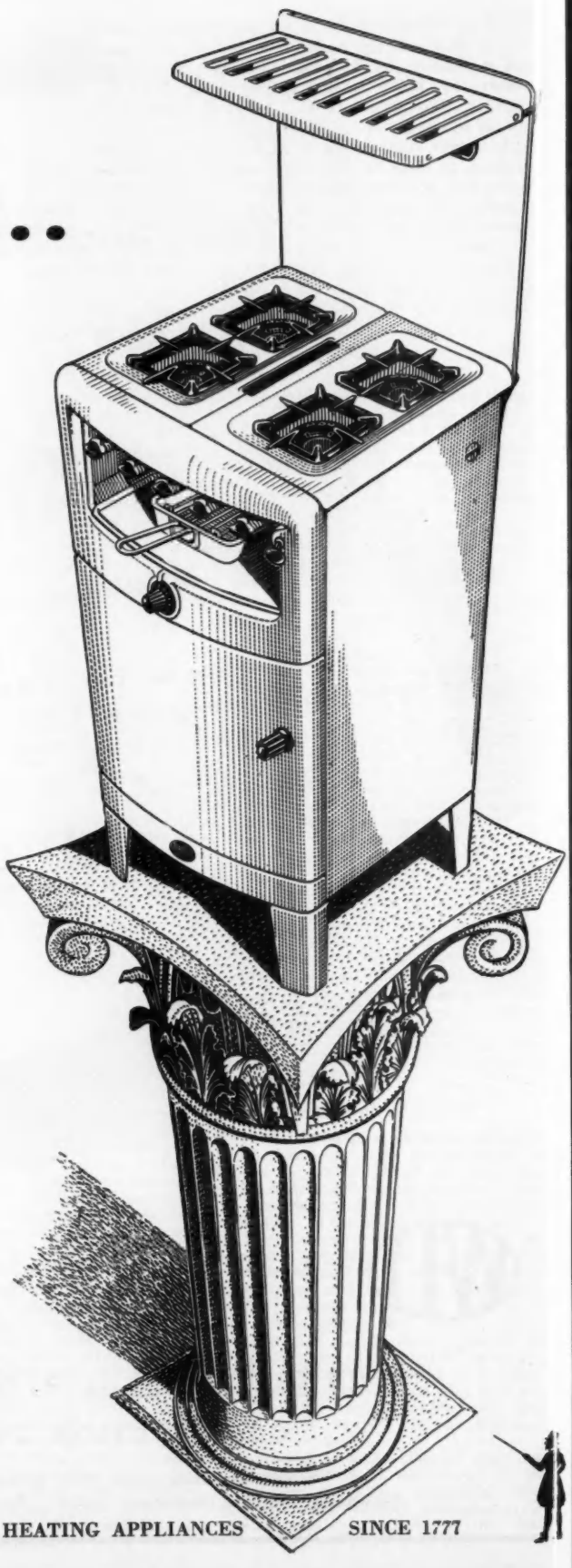
CONSTRUCTION COMPANY LTD.

Woodall-Duckham House, 63-77 Brompton Road, London, S.W.3
Telegrams: Retortical (Southkens) London Telephone: KENsington 6355 (10 lines)

Pardon our conceit, but . . .

. . . we think
the Flavel **68** is
the most pleasing
and efficient
medium priced Cooker
in the Country . . .
and judging by its popularity

housewives think so too!



THE FLAVEL

68

BOW-FRONT

GAS COOKER

A product of

FLAVELS of LEAMINGTON

MAKERS OF FINE QUALITY COOKING AND HEATING APPLIANCES SINCE 1777

The first condition was that, as a means of removing hydrogen sulphide from town gas to the degree of purity required by the Ministry of Fuel and Power, the process was a proved success. The second condition was that what might be called a subsidiary of the purifying process—namely, the recovery of the elemental sulphur in a state of purity sufficiently high to command the highest price had not yet reached finality, and it was accepted that further work remained to be carried out.

It would be appreciated also that the effluent disposal part of the problem was associated closely with the sulphur recovery procedure.

Turning now to a brief comparison of plant behaviour at Linacre and Gloucester, and without going into too much detail, it could be said that while the cyanogen complexes appeared to be formed and to function satisfactorily at Linacre, that desirable state of affairs had not yet been reached at Gloucester although, in general, other conditions were similar.

As so often happened in the case of new processes and plants, the main difficulty of the oxidation of the circulating liquor was masked by circumstances mentioned later in connection with sulphur recovery. The capacity of the plant and the purity of the outlet gas were linked closely not only with the hydrogen cyanide content of the gas but also with the formation of complex substances vital to the rapid regeneration of the liquor. This was the problem which had not yet been solved satisfactorily at Gloucester, but he had no doubt that it would be, although how critical the conditions would prove to be remained to be seen.

The Effluent Problem

In connection with sulphur recovery, Mr. Townsend mentioned that it was hoped originally to recover the sulphur by means of autoclaves. When that procedure was given up, film driers were used, but, on account of reduced purity of the sulphur they were abandoned and substituted by a coagulating tank, rotary vacuum filter, and rotary drier. This procedure, which was essentially a 'batch' process, gave a reasonably pure sulphur, but, of course, produced effluent. At Gloucester, where a serious effluent problem existed before the installation of the liquid purification plant, attempts were naturally made to prevent any aggravation of the situation and, if possible, to improve it. Accordingly, the plant was designed to de-water the sulphur sludge as much as possible before passing it to the rotary driers, but several difficulties were encountered. The first was intense frothing in the oxidisers, which actually limited the gas throughput of the plant for a time, and this trouble was traced to resinous substances extracted from the wood-filling of the washers, causing a reduction in the surface tension of the circulating liquid.

After the lapse of about two months this corrected itself, but the rated plant capacity could still not be reached because the sulphur sludge contained more water than the driers were capable of handling. A series of simple structural alterations to the de-watering section of the plant partially overcame this difficulty and enabled the sludge to be treated on a film drier. This procedure did not produce any noticeable atmospheric pollution, and, of course, largely eliminated the effluent problem, but the purity of the sulphur was reduced to 55% at a moisture content of 15%. A considerable amount of ferric hydrate was present, representing a reagent loss, but the sulphur, apart from the economic aspect of its purity, still appeared to be suitable for use in contact acid plants.

It was proposed to carry out tests with both the film drier and a vacuum filter in an endeavour to strike an economic balance between the enhanced financial value of a purer sulphur and the cost of disposing of the effluent associated with its production.

Ammonia as Alkali

There were interesting references in the paper to the use of ammonia as the alkali instead of soda-ash. At first sight this appeared to be the logical procedure, since ammonia was a by-product of carbonisation and should assist in reducing the reagent costs of the process, but there were practical difficulties of considerable magnitude in the path. The extraction of residual ammonia from the gas after purification from hydrogen sulphide did not present serious difficulty, especially in the case of new plants where the ammonia washers could be located as desired, but the recovery of ammonia from the air leaving the oxidisers was much more serious, particularly so when it was remembered that the air consumption of the plant, as at present worked, was approximately 30% of the gas throughput. This question of alkali was a problem for the future and, as Mr. Townsend pointed out, work on other methods of oxidation should be fruitful.

At Gloucester no trouble has been experienced so far with naphthalene, either in the form of blockages or as odour from the oxidisers or driers.

Perhaps the most important point raised by Mr. Townsend under the heading 'General Observations,' was, in his opinion, item (1), where it was stated that the plant in its present form could not be operated without catch boxes. It was difficult to avoid the view that anyone reading the 'General Observations' would reach a wrong conclusion because there was, he suggested, an element of fear abroad that the process did not offer those necessary safeguards against 'dirty' gas which the industry had associated over the years with oxide purification. If it should turn out to be the case that catch boxes were a necessary accessory to the process, that would be an almost fatal disadvantage. When their plants were ordered, they definitely did not consider catch boxes; in fact, except in one case where suitable oxide purifiers already existed, the lack of space for such purifiers was one of the major items affecting the choice of process.

However, Mr. Townsend offered some comfort by pointing out that in the case of coal gas, as at Liverpool, the necessity for catch boxes was mainly due to the blower and pumps being driven from a single line shaft, due to lack of availability of electric motors at the time of erection of the plant, and that even belt tightening necessitated a shut-down.

In the case of the Gloucester plant, all pumps and blowers had individual drives and the standby diesel engine drove a generator. The engine was fitted with an electric oil-heater and could start up in 30 seconds, which left an ample margin of time.

As already mentioned, the use of catch boxes up to the present at Gloucester was due to failure to provide the necessary amount of 'blue' in the circulating liquor.

In the case of the purification of carburetted water gas by this process, of which he had had no experience, Mr. Townsend pointed out that the necessity for catch boxes was a result of the less satisfactory chemical aspects of the process; in other words, presumably, the absence of hydrocyanic acid. Whether it would ever be found an economic proposition to add a cyanogen compound, such as sodium ferrocyanide, to the circulating liquor in such cases was worth investigation, although, of course, it did not follow that the correct cyanogen complex would be formed in that way.

It could be accepted that the satisfactory operation of the plant depended upon the behaviour of the oxidisers, which might be looked upon as the heart of the business. At Gloucester, this was the fundamental part which so far had caused trouble, although, in view of experience elsewhere, there was no reason to assume that the correct conditions would not be found.

Mr. Townsend did point out that in view of his experiences there was no reason why a completely reliable plant without catch boxes could not be designed.

Economic Considerations

On the question of costs, it was too early to make definite statements, particularly since there were factors involved that were difficult to evaluate, such as ground space, labour conditions, and the spent-oxide market. However, Mr. Townsend's observation concerning a so-called 'scalping' plant was of interest, because one of the plants contemplated in the South Western Area would probably be designed to act as a 'scalping' plant in conjunction with a practically new dry-box system or, alternatively, to be used as a complete purifying plant.

One final point on which Mr. Townsend's experience was important related to the question of plant corrosion. The locking up of the hydrocyanic acid might be the reason for the lack of attack on the various parts of the plant.

Mr. N. H. Williams (Director, Humphreys and Glasgow, Ltd.) said that Mr. Townsend made it clear that he realised that the reported period of operation with carburetted water gas was inadequate in duration and for other reasons to serve as a conclusive basis for judging the performance of the 'Manchester' purification process with this type of gas—*i.e.*, a gas containing little or no cyanogen. They had hopes that the North Western Gas Board would again provide facilities for a further trial period with carburetted water gas.

In drawing conclusions from the results obtained while purifying carburetted water gas, Mr. Townsend had refrained from attempting to make allowances for adverse factors known to be operating at the time, especially inadequate oxidation and loss of iron in the froth. He would like to consider these two factors separately, taking oxidation first.

Experience with the 'Manchester' purification process had clearly shown that the oxidation stage set a limit to the capacity of the plant. Mr. Townsend reported that during tests on carburetted water gas the oxidisers were not fully effective. This factor alone was sufficient to limit the performance of the whole plant. In presenting the paper, Mr. Townsend drew attention to the difference between oxide box purification,

in that, he said, the liquid purification process was more sensitive than increasing sulphur load. He (the speaker) thought it was probable this was because the limitation was on the oxidising side of the process and not on the absorption side.

In general, the absence of cyanogen complexes in the liquor when purifying carburetted water gas made the oxidation process slower and, when the plant was specifically designed to use carburetted water gas, this must be allowed for.

Mr. Townsend had discussed the use of injectors for oxidising the process liquor. It was obviously desirable that the means of supplying the air for oxidation should be as simple as possible and should require the minimum of maintenance while being accessible for inspection. In addition, good utilisation of the oxygen contained in the air should be achieved. All these requirements could be fulfilled by injectors.

Although the quantity of air injected per unit of liquor was, as pointed out by Mr. Townsend, not high, this air was in a very finely divided state which resulted in highly efficient utilisation of the oxygen available. They had, in fact, when oxidising a liquor containing cyanogen complexes measured about 50% of the oxidation as occurring in the tail-pipe of the injector or within a minute or two of leaving it. They had also measured about 50% usage of the oxygen contained in the air.

Air Injection

Mr. Townsend had based the power comparison between injectors and the Linacre system of oxidisers on the basis of air throughput only. This did not take into account the fact that a good deal less air was required when the air was finely divided and intimately mixed with the liquor than was the case when the air bubbles were coarser and mixing was not as good.

It might be noted that to obtain the maximum use of the rising air bubbles when using injectors it was essential to have an upward flow of liquor. In adding some injectors to the Linacre plant, it was not possible to arrange for this upward flow and the liquor flow was actually downward.

He would turn to the second of the factors which he referred to earlier—namely, the loss of iron from the froth.

When operating in the absence of cyanogen complexes, it was essential that there should at all times be sufficient active iron hydroxide in the system to react with all the absorbed H_2S. In other words, the performance of the plant could be limited by lack of active iron hydroxide. During most of the run reported, the iron reagent was added at the inlet to the oxidisers, in which vessels it did not enter into the process, and was straight away lost from the circuit by flotation with the froth before it could take part in the purification.

The desirability of being able to put the iron carried by the froth back into the circulating system was evident. To do this, the solids contained in the froth must first be brought into the form of a de-aerated suspension. A centrifugal device had been produced, having no moving parts and operated by the pressure of the froth, which would automatically produce such a de-aerated suspension. By constantly returning a regulated proportion of this recovered suspension to the circuit uncontrolled loss of iron reagent from the system could be prevented. This was not only desirable for economic reasons when operating in the absence of cyanogen compounds, but by its stabilising effect on the system was expected to result in greater regularity of working and in the reduction of supervisory requirements.

Mr. Townsend had referred to the use of the 'Manchester' purification process for the removal of the bulk of the H_2S only. It was not clear whether his statement referred only to the provision of liquid purification plant itself for partial purification, or whether it included also the provision of new oxide boxes for completion of the purification. There was, however, no doubt that a 'Manchester' purification plant for, say, 80% to 90% removal of H_2S from a given gas was very substantially cheaper than the same type of plant for complete purification of the same gas, due to the reduction in the lengths of intercommunicating mains and pipes; also the operating charges were greatly reduced due to the much smaller volume of liquid to be pumped.

Mr. R. J. S. Thompson (Continental Representative, W. C. Holmes and Co., Ltd.) mentioned a visit which he paid to a Continental gasworks last year. During the visit they were shown the liquid purification plant, and its history was related. It had been installed as a scalping plant to help the overloaded boxes, and was of the absorption and oxidation type using an alkaline absorbing solution. It had achieved its purpose, but was expensive to run. Then someone had the idea of adding ordinary oxide to the circulating liquid. The result was excellent. The removal efficiency of hydrogen sulphide was improved at lower operational cost. The only people who were unhappy were the actual operators, who objected to shovelling the oxide into the circulating liquor. Then someone had another brilliant idea. He proposed the use of copperas instead of ordinary oxide. This was tried. Operating efficiency was fully maintained, and perhaps increased, while the workmen were quite happy handling the nice clean copperas crystals.

He examined the sulphur product and, of course, it was identical with 'Manchester' 'sludge.' At first it had been sold with the normal spent oxide, but eventually someone had been found who was prepared to pay a higher price for it on account of its higher sulphur content.

Value of Sulphur Sludge

The basic point of the story was that the gasworks in question had re-discovered the 'Manchester' process and was very pleased with the results. The secondary point was that someone was found who appreciated the enhanced value of the sulphur sludge produced, and was prepared to pay for it. This might perhaps offer some encouragement to the users of the 'Manchester' process in England.

A remark made by Mr. Townsend when introducing his paper, to the effect that Continental works were beginning to take an interest in the 'Manchester' process, prompted him to add that in addition to the works to which I had referred and which stumbled on this process, he knew of one other very large Continental works where a plant on the 'Manchester' principle had been in operation for many years.

Operational costs of liquid purification plants always seemed to be equal to, or greater than, those of normal dry-box systems.

It was well known that the operational cost of dry purification was almost exclusively the cost of handling materials, and data to this effect had been published abroad and could easily be established. An examination of normal cases showed that, using the dry-box system, the recovery of one ton of sulphur from gas necessitated the handling of 5 to 10 tons of material, more or less according to local conditions.

The so-called 'Bournemouth' dynamic purifier seemed to him to be an attempt to use a solid reagent in the manner of a liquid absorbent, and occupied a half-way position between really dry and really liquid systems. Although the system had not been fully established in practice, it seemed to be basically sound, and as far as was known seemed to need the movement of something like 100 tons of oxide for the recovery of 1 ton of sulphur—say, 10 or 20 times the movement of materials in dry-box purification.

So far as liquid absorbents were concerned, the amount of liquid circulated in proportion to sulphur recovered varied widely with different liquid systems. The data given in the paper seemed to show that for the 'Manchester' system many thousand tons of liquid had to be circulated in the absorption towers for each ton of sulphur recovered from the gas; all this liquor had to be circulated again in the oxidisers.

Basic Facts

Similar conditions applied to all liquid purification systems in successful operation. Some systems using lower circulation rates needed heat for revivification of the solution. Power had been replaced by heat.

Recapitulating, for the recovery of 1 ton of sulphur, the dry-box system involved the handling of 5 or 10 tons of material; the dynamic purifier had to handle 100 tons of material, while the figure for liquid systems stretched to many thousands of tons.

These were basic and apparently unalterable facts. Consequently, although liquid systems made use of pumps, the difference in weight of materials to be handled must restrict the economics to be achieved by liquid systems considerably, and this alone helped to explain why liquid systems had not and apparently could not achieve such spectacular results as some people would wish.

Liquid systems had other advantages which were by no means negligible, but economy of operation was not necessarily one of them, especially so far as coal gas treatment at low pressures was concerned, in which the hydrogen sulphide concentration seldom exceeded 1% by volume in English conditions and was often less than 0.5% in Continental gasworks and coke oven works.

Liquid systems really began to come into their own if the hydrogen sulphide concentration in the gas could be increased substantially. Such conditions occurred when the gas had to be compressed for distribution purposes. Unfortunately, pressures which really helped the case were not used in England.

A general rule for liquid versus dry purification systems could easily be formulated:—

High sulphur gases favoured liquid systems; low sulphur gases favoured dry-box systems.

It was not difficult to support this

statement from the known data. The dividing line was another matter and must depend on many factors, many of them of purely local significance.

He suggested that if the hydrogen sulphide partial vapour pressure was less than 6 mm. mercury, present liquid systems would not generally be economic, though they might have other advantages worth considering. If the vapour pressure was over 10 mm. mercury, it was probably worth while examining one of the liquid systems available on the economic basis alone, the more so the higher the vapour pressure. The dry oxide systems achieved little advantage in operational economics as the concentration of hydrogen sulphide in the gas increased, though they might show savings in proportional capital cost.

Mr. Ralph Pollard (Research and Development Engineer, R. and J. Dempster, Ltd.) said there were a number of liquid purification plants at work in the country, and not all of them were operating for the complete removal of hydrogen sulphide. There were many plants of different types capable of some 80% removal, but the first claim of the 'Manchester' process had always been that it is a 100% plant, and in his view they should develop it on those lines.

The author had quite rightly drawn attention to the need for some measure of protection in the event of pump failure. He was familiar with a plant of about 3 mill. per day capacity which had been so designed that, in the event of pump failure, there was a gravity feed of regenerated liquor from the oxidisers to the purifying sprays of limited duration which would allow time, for example, for the automatic operation of a standby generator to supply power to the pump motor, or any other of the many schemes which might be devised for the continuance of a supply of washing medium at the full circulating rate.

Chemical Engineering Aspect

The importance of the oxidising section of the plant was apparent from the results and observations given in the paper. Some further work on this part of the process would be of great value. This led him to suggest that a consideration of the operation and possibilities of the 'Manchester' process plant should be viewed as consisting of two main parts. Mr. Townsend had supplied one part—the chemistry and operation of the process; but the chemical engineering aspect was one which had yet to be fully investigated. Work was shortly being undertaken to obtain data of a controlling nature relating the sizing of the vessels to the many variables.

While it was always possible to design a plant for a given job, it was not so easy to declare that a plant was the 'right size' for the job and that safety had not been sought at the expense of speed, etc.

Control of Variables

It was hoped to control as many of the variables as possible and to concentrate on particular sections of the plant at one time, and to obtain physical data such as those used in chemical engineering design in and outside the gas industry today. They would tend to completeness of their consideration of the merits of the process when this aspect had been advanced and allied to the chemistry so ably recorded by Mr. Townsend. Plant would be designed for optimum values and the economics of the process put in the correct perspective.

Mr. Charles Cooper (W. C. Holmes & Co., Ltd.) said that his attitude to the various liquid purification processes had been that any method of removing H_2S from gas which delivered the H_2S as an intermediate, requiring on the gasworks a second process for its conversion, was less preferable than one which relieved the works of a chemical manufacture, either to produce a pure sulphur or a sulphuric acid. This view was formed when some recent developments (in particular, the need to purify gas in large volume from coke ovens) were hardly in prospect. Generally, while they had a more dispersed gas manufacture the proposition held, in my view.

The paper described a reasonably successful application of a process which was capable of complete purification to recognised standards. It was to be noted that it appeared to derive from an American process 25 years old, but in fact this particular procedure appeared to follow more closely the Belgian process quoted, which had a different chemical cycle.

The author pointed out that gas from continuous vertical retorts and from water gas was less amenable than that from horizontal retorts for his purpose. This was a matter not yet clear, and in fact it was confused by the fact that continuous vertical retort gas at Rochdale Road, Manchester, had been treated in a similar manner, the distinction being largely in the methods of a separation of the free sulphur. The technique of Linacre was not used at Rochdale Road in hardly any important particular. The only other plant working on continuous vertical retorts was comparatively recent and it seemed at present that the Linacre cycle was not easy to attain under such conditions.

Towards Pure Sulphur

In such a case they were apparently attempting to obtain a stable working medium with a different set of values of the substances which may be expected to participate—CO_2, H_2S, HCN, and NH_3. The rise and fall of suspended blue could be very rapid, as it varied in the Linacre plant, but in the case to which he was referring the swing appeared to go down to a level of relative inactivity.

The preparation of a desirable sulphur product was assisted by the behaviour of the sulphur floated off from this cyanide-rich suspension, and the improved product was in his opinion more likely to give, in a later stage of development, a cycle process yielding pure sulphur.

The effluent production varied with the chemical conditions, but if they took an average value, it seemed to give a ratio of about 25% gross oxygen demand additional to the normal ammonia still effluent. This figure was fairly close to that of the author, and to complete the assessment they had to make an addition to the normal still effluent to represent liquid drainage from oxide boxes, which was less than that from this process, but minimised the difference.

Hotel and Catering School

WHEN the Wales Gas Board held its monthly meeting at Llandudno last month the members paid an official visit to the Caernarvon Education Committees's Hotel and Catering School, which provides training for students of both sexes who have entered, or wish to enter, the hotel and catering industry. The school is constructed as a replica of a modern hotel and, as reported in the *Journal* of January 21 (p. 147) the kitchen is equipped with the best of modern gas appliances.

Guests at the Catering School included Mr. T. Mervyn Jones, Chairman of the Wales Gas Board, third from the left in our photograph.

There's a NEW WORLD PRODUCT OF Radiation Ltd *for every kit*

NEW WORLD NEW WORLD NEW WORLD

In our recent survey of kitchens fitted with NEW WORLD Ranges, picked at random with the co-operation of Gas Boards, the average size was found to be 108 sq. ft. or 9′ x 12′. Ranges are fitted in kitchens as small as 30 sq. ft. (6′ x 5′), 42 sq. ft. (7′ x 6′), 48 sq. ft. (8′ x 6′) and 60 sq. ft. (10′ x 6′) and are giving complete satisfaction.

Of normal depth and height, the width is only 36½″ (39″ to include Gas Match).

Prospective purchasers can be assured that the NEW WORLD Range will . . .

kitchen and every purse!

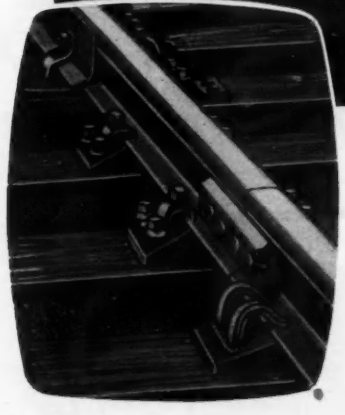
RADIATION GROUP SALES LTD., Head Office & Showrooms: 7, Stratford Place, London, W.1. Telephone: MAYfair 6462.

NEW WORLD NEW WORLD NEW WORLD

A WARD-BUILT RAILWAY SIDING doesn't just happen! Rather is it the result of skilful planning allied to sound railway technique.

Wards have been building sidings for a variety of operating conditions for almost half-a-century and thus bring to the subject an extensive knowledge of every aspect of railway siding planning, construction and maintenance for industrial usage.

Those who are concerned with the operation and maintenance of private railway sidings will find much useful information in the second edition of our booklet, "Rails and Rail Accessories." Copies forwarded on request.



109 lbs. F.B.

rails are used throughou this siding. The inse shows the detail of faste ings for this type of ra

The Railway Siding Consultants and Contractors

THOS W. WARD LTD

ALBION WORKS · SHEFFIELD

TELEPHONE 26311 (22 LINES) · TELEGRAMS 'FORWARD' SHEFFIELD

LONDON OFFICE: BRETTENHAM HOUSE · LANCASTER PLACE · STRAND · W.C.2

IN PARLIAMENT

DISTRIBUTION OF FUEL-SAVING APPLIANCES

IN the House of Commons on July 7 when answering a series of questions about present coal stocks and prospective winter supplies, Mr. GEOFFREY LLOYD, Minister of Fuel and Power, referred to the 2 mill. fuel-saving appliances which were delivered to the home market during the year 1952. He drew particular attention to the growth of distribution of such appliances over the past three years—a six-fold increase of the 345,000 appliances distributed during 1950— and described the operation as 'a remarkable achievement.' Looking ahead he said, 'If the 1952 rate could be maintained for another two years, about half the homes in the country will have these appliances.'

But this happy prospect did not deflect Mr. NOEL-BAKER and Mr. C. J. M. ALPORT from making it clear to the House that the ultimate positive saving in fuel will depend as much on the practical efficiency of the appliances as on the number distributed. Mr. Noel-Baker wanted to know what steps the Minister had taken to establish new standards of performance, based on achieving a room efficiency of 40% with coal, for solid-fuel room-heating appliances, as proposed by the Ridley Committee. Further, Mr. Noel-Baker sought an understanding that approval will not be given to any types of appliance which do not meet such a standard of efficiency, and requested an assurance that raw materials will be made available for the manufacture of sufficient quantities. Mr. Lloyd replied that new standards of performance were brought into force on June 30 and that the efficiency stipulated is comparable with the standard recommended by the Ridley Committee. He was careful to add that the achievement of comparability will be dependent upon appropriate installation of the appliance. It is dependent also, we inferred from the Minister's remarks, upon revised methods of test which accompanied the establishment of the new standards.

On the question of withholding approval of types of appliances which do not measure up to the new standards, it did not seem to us that Mr. Noel-Baker obtained the understanding he sought, since he had to be content with the answer, 'The specifications (of the new appliances) are extremely elaborate, and they have gone out to the industry.' Neither could he have been entirely happy (since the question referred to the supply of appliances over a future period) with the Minister's reply regarding the availability of raw materials for appliance manufacture. 'I do not *think*,' said Mr. Lloyd, 'that there is any difficulty about raw materials *at present*. (The italics are ours.)

It was as clear to Mr. C. J. M. Alport as it was to many other members that the overall level of fuel-saving efficiency in the future will depend, in part, on appliances installed in some cases as long ago as three years, and that we must not permit ourselves to be misled into calculating long-term aggregate savings from a formula containing a factor of efficiency which came into force only a week before. He, therefore, wanted to know how many of the 2 mill. appliances already distributed came up to the standard of efficiency which is now in operation. The House was saved from an excursion into higher mathematics by the Minister's inability to supply the precise information. Had the mathematical excursion been undertaken it must surely have moved into calculus, because in reply to a later question by Mr. A. C. MANUEL, the Minister replied: 'I would like to point out that the efficiencies stipulated until the new standards came into operation applied only to coke, whereas the present new specifications of efficiency apply also to coal.'

The same question that produced this somewhat worrying answer also moved the House into brief contemplation of the problems associated with the selling of coke and lower grades of coal. Mr. Manuel thought at that time the only way to sell such fuel was to push on with the production of fuel-saving appliances. We, with the advantage of writing these notes a few days later, can now point out that the Minister had other views—the expedient of making high-grade coal dearer and lower-grade coal cheaper. The fact that the same procedure has been applied by another Ministry to promote the consumption of ewe mutton does raise the question of whether a third Ministry will begin to contemplate the issue of carbon-tipped dentures so that in due course a substantial part of the population will be equipped with appliances to save the consumption of high-grade meat.

Whether you will upbraid the Government for helping itself first, or compliment it on taking its own medicine, depends upon your point of view, but Mr. Lloyd disclosed to the House that: 'About 5,000 improved solid fuel appliances have been installed in Government buildings in place of the old type of open grate . . . . In addition, training courses are run for stokers and others . . . . and steps are being taken to improve cooking equipment in canteens.' Because the average Briton connotes stoker with locomotives, and improved cooking threatens to bring up ewe mutton again, we sensed an impending Ministry stew.

ATMOSPHERIC POLLUTION ENQUIRY

On July 7 Mr. G. NABARRO, the Conservative member for Kidderminster, posed the Minister of Housing and Local Government a circumnavigational question, which ultimately showed its purpose to be to discover whether anybody imbued with a passionate devotion to Scottish interests will be on the inside of the committee to be established to investigate the problems arising from smoke pollution of the atmosphere. The question failed in its purpose because as Mr. E. MARPLES (Parliamentary Secretary to the Minister) explained, the Minister is not yet in a position to satisfy any curiosity regarding the composition of the committee. But whoever prodded Mr. Nabarro into asking the question will have discerned a twinkle of hope because it wrung from Mr. Marples the fact that the Minister is in close touch with the Secretary of State for Scotland.

Following Mr. Nabarro's question came one from Mr. S. HASTINGS, member for Barking. His choice of words seemed to suggest that the air which fills the capacious lungs of the bonnie Scot, no matter how polluted, will for ever be of champagne quality compared with the lethal vapours which incessantly erode the bellows of his Barking constituents. 'Will the Minister,' asked Mr. Hastings, 'consider not only pollution by smoke, but also by noxious gases, the result of a combination of coal and other fuels.' Having breathed the air north of the border and tasted it in the vicinity of Barking Creek we unhesitatingly suggest that the second question deserves the prior heed.

To Mr. Hastings we are indebted for the idea that coal is found in combination with other fuels. Our personal experience in this matter has been limited to burning coal in combination with slate (a process forced on our outmoded fire appliance by some persons unknown). We found that the formation of noxious gases was an exceedingly remote possibility due to the almost complete incombustibility of the mixture.

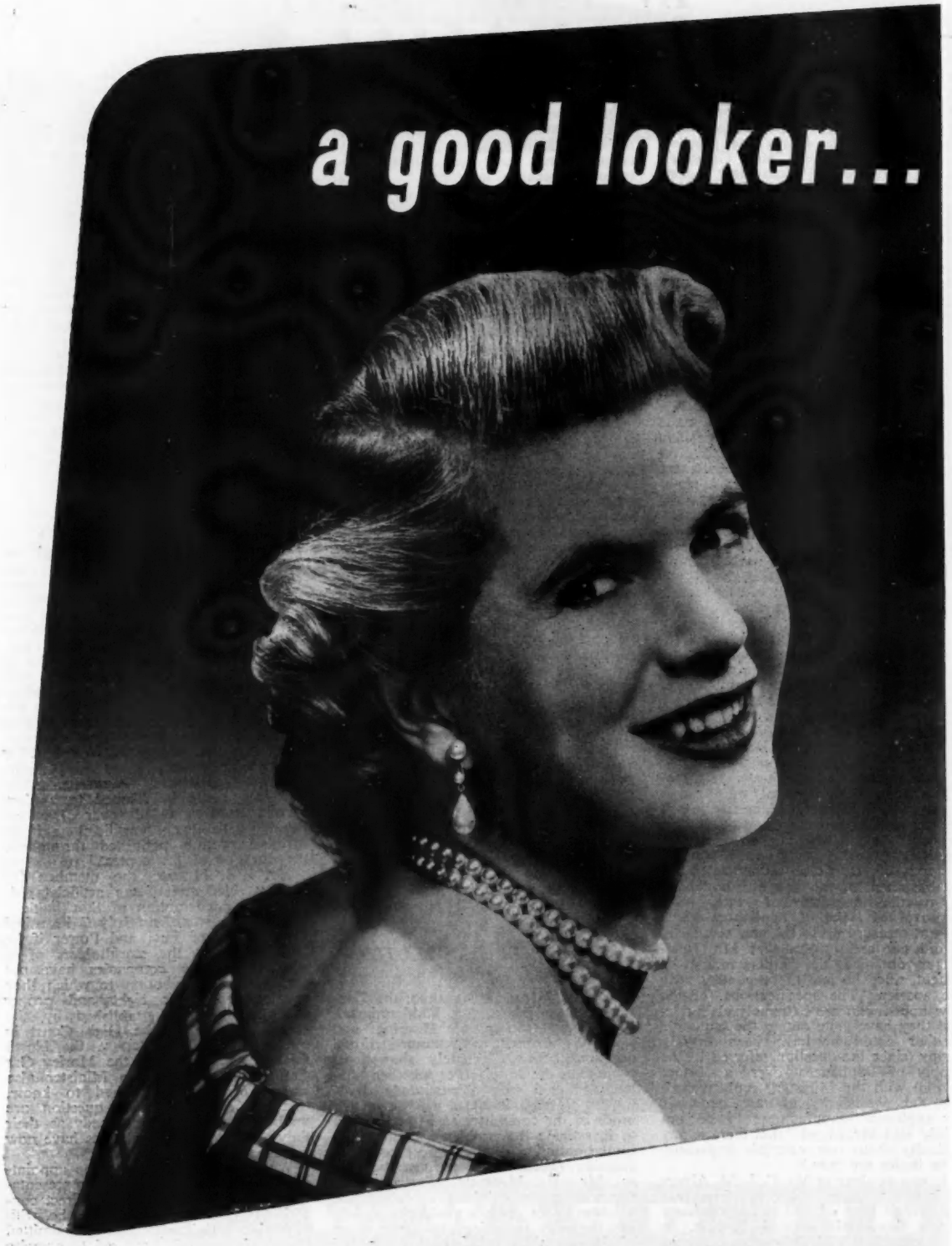
GAS COMPANIES (*Stockholders Compensation*)

Any brain philosophical enough to endure contemplation of those two seemingly negative assets, Post War Credits and Distribution of Payments to Stockholders of Gas Companies, at one and the same time, will have perceived a situation substantially akin to that created by a slow bicycle race. But to make the simile truly applicable a correction to the course and modification of the rules are essential. Whereas the international standard for a slow bicycle race in the village sports is set to assure victory to him who can dawdle best for a few minutes, the Post War Credits versus Stockholders' Payments affair can only really be likened to a slow bicycle race crawled over Daytona Beach with every artificial aid to arrested motion permitted throughout the duration of the contest.

Mr. I. J. PITMAN, the member for Bath, tackled one of the artificial aids to the arrested motion of Stockholders' Distribution when, on July 7 he asked the Minister of Fuel and Power if he is aware that the stockholders of a number of gas companies have not received the distribution to which they are entitled, their right and proper due having been established by the recent decision of the High Court in the case of Whittington v. the North Eastern Gas Board re the Morley Gas Company. And is the Minister also aware, Mr. Pitman wished to know, that the stockholders in question are unable to pursue their remedy as their duly appointed representatives have now ceased to hold office.

Whatever bar there is to the appointment of fresh stockholders representatives seems to be under the direct control of Mr. Geoffrey Lloyd and he, with exemplary ministerial caution, admitted that he is certainly prepared to exercise his powers under Section 27 of the Gas Act to permit a stockholders' representative to be appointed. Mr. Pitman's request that the Minister should similarly oblige cases arising out of the basic price company did not prove so successful because Mr. Lloyd required notice of that supplementary question.

D


a good looker...

and a fine cooker

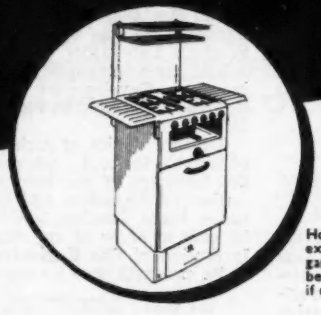
No. 20

CENTURY

GAS COOKER

Vitreous enamelled surfaces throughout — exterior finished in cream · four dual-purpose hotplate burners—for fast-boiling or simmering · large griller · hotplate fittings easily removed for cleaning · hotplate-well free from dirt traps · safety-type gas taps · double-shelf plate-rack · roomy oven giving high-quality cooking performance with minimum gas consumption · Mainstat oven-heat control · flash tube lighting to oven burner · drop-type door · used oven heat vented in front of back-plate · storage space in plinth base

The Century combines efficient performance with ease of cleaning



Hotplate side extensions and gas pistol can be supplied if required

NOTE THE NAME—MADE BY MAIN

R. & A. Main Ltd · London and Falkirk

MR. CROWTHER TELLS NORTHERN G.C.C. OF

Hopes of Pegging Prices

THE value of the Northern Gas Consultative Council as a link between the consumer and the Northern Gas Board was stressed by Mr. E. CROWTHER, Chairman of the Board, when he addressed a meeting of the Council in Newcastle. Mr. Crowther pointed out that the objects of the two bodies were the same—the provision of a better service to the consumer—and there was no difference of opinion between them. The Board's policy from the outset had been to achieve the utmost confidence between the two bodies and to avoid any appearance of reserve or the withholding of any information.

'With that atmosphere of confidence,' said Mr. Crowther, 'I believe that the Board and the Council have gone some considerable distance in the past four years towards improving the supply of gas and service to consumers. Four years is not a long time to accomplish major engineering projects and the older members of the Council are aware of the arrears of plant repair and renewal which existed almost everywhere at vesting day.

'The Council has been enormously valuable to the Board and we have the benefit of the presence of the Chairman of the Council at our meetings, who is able to bring forward matters affecting the interests and needs of consumers. The Board relies in a very large degree upon the Consultative Council because through it we are left in no doubt as to the needs of the consumers.'

Mr. Crowther said that the Board had been faced with a period of inflation and rising prices ever since it took over its business. There had been an all-round increase of £1 per ton on the price of coal the Board had to buy. That and other inflationary aspects of the situation had made it impossible to avoid certain increases in gas prices, but he thought that the Board had succeeded in satisfying the Council that they had been limited to the lowest amount possible.

The Last Time Costs Rose

'On the last occasion when an increase in coal prices took place,' continued Mr. Crowther, 'the Board was able to leave the published prices as they were and hoped to meet the extra cost by the abolition of discount and a small increase in the prepayment supplement. The Board hopes to maintain prices at their present level without any further increase, but it is difficult to give assurances on that point. Some commodities are cheaper than they have been, but who can tell what the price of coal will be a year hence? The Board will struggle to do nothing themselves to increase the cost of living and will do their best so far as the prices of gas are concerned to keep them where they are. The accounts for the year ended March 31, 1953, are now complete, and I think that the Council will not be dissatisfied with the showing that the Board has made in its fourth year. Any small reserve that has been accumulated will act as a little cushioning if our anticipation of holding the line in the current year should be more difficult than we had hoped.'

Turning to the question of uniformity in the price of gas, Mr. Crowther made reference to a price contour map of the area which showed that the lowest prices were in the large industrial belt on the North-East coast and the smaller industrial area in West Cumberland. The Board, said Mr. Crowther, could afford to sell gas somewhat cheaper in these areas where the price of coal was relatively low and there was density of consumption together with the accessibility of coke oven gas supplies.

Prices Related to Costs

Travelling away from these zones the prices increased by stages to the maximum prices in the more remote country villages. The Council would appreciate that it was more expensive to run a small works than a large one and the Board felt that it should relate prices to the costs of manufacture. The nature of the Gas Act was such that every area board was a separately constituted financial concern and had to pay its own way. It seemed inevitable that prices would be different between different boards. As the price of gas could not be uniform over the whole of the country through the present arrangements of the Gas Act, there seemed to be no good reason to make it uniform in the 12 individual areas. Mr. Crowther hoped that the Council would take the view that it had taken in the past, which was to endorse the principles set out in the Board's statement of policy—that the actual prices should reflect the inherent differences in the cost of supplying gas in different localities. The Board thought that it was on the right lines in adhering to such a policy.

After Mr. Crowther had left the meeting a resolution was submitted from the Carlisle and District Trades Council which said: 'We are of the opinion that price of gas should be on a regional basis and are desirous that the Council should support this opinion and inform the Gas Board of our views.' A similar resolution was submitted by the Cumberland and Westmorland Federation of Trades Councils.

It was agreed that the two Councils should be informed in detail why the Consultative Council was unable to make a recommendation to the Board in favour of the resolutions submitted.

Alderman J. HOY, Chairman, reported that at the request of the Northern Gas Board he had been in touch with Ennerdale Rural District Council on the question of gas supplies for a prospective housing scheme under which some 200 houses would be built at Egremont. 'In a letter I asked the Council before embarking upon any policy with regard to this estate if it would be prepared to receive a deputation from the Consultative Council to discuss the question of freedom of choice in the use of fuel for the prospective tenants,' declared Alderman Hoy. 'I have received a letter from the Clerk stating his Council is of the opinion that no useful purpose would be served by such a meeting and no action would be taken. This is the first refusal I have received from a local authority. I consider that it is an important matter as the Board has spent many thousands of pounds in trying to improve services throughout the area and it is only right for the Board to expect some return from the very heavy capital development programme it has embarked upon. It is also important that the principle of freedom of choice should be safeguarded.'

Councillor N. F. SMITH, of Whitley Bay, commented: 'I suggest that Alderman Hoy should write again to the Clerk to the Council informing him of his experience with the Borough of Blyth on this issue. It is well known that the running costs of all-electric houses are heavy and the tenants clamour for gas afterwards. Running costs are not only heavy, but maintenance costs also are far in excess of those for gas appliances.'

The Council decided that Alderman Hoy should request the Ennerdale R.D.C. to reconsider their decision.

The Testing of Timber

MEMBERS OF THE INSTITUTION OF GAS ENGINEERS are invited to attend a symposium on Testing and Stress Grading of Timber, to be held at the Institution of Civil Engineers, London, S.W.1, on the morning and afternoon of Tuesday, September 22. The symposium is being organised by the Incorporated Association of Architects and Surveyors under the ægis of the Joint Committee on Materials and their Testing, of which the Institution of Gas Engineers is a member. The following papers will be presented and discussed:

10 a.m.: 'Methods of Test of Small Clear Specimens,' by F. H. Armstrong (Forest Products Research Laboratory).

11.30 a.m.: 'The Testing of Structural Components and Structural Units,' by J. G. Sunbury (Forest Products Research Laboratory).

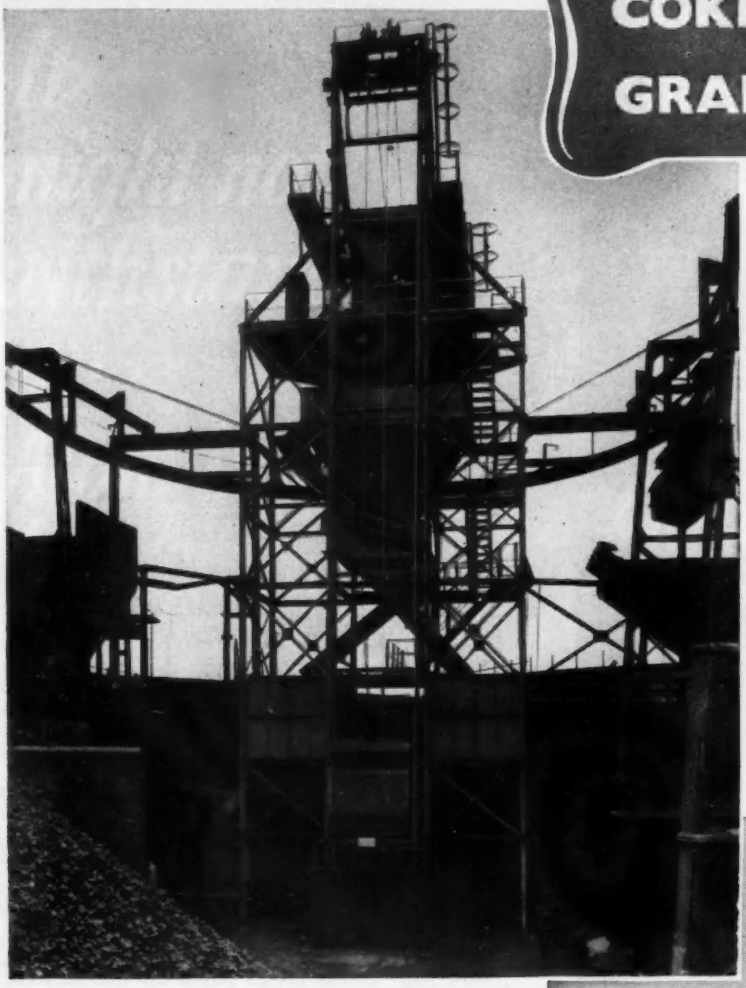
2 p.m.: 'The Mechanical Testing of Sawed Timbers and Application of Data to Stress Grading,' by W. J. Smith (Forest Products Laboratory, Canada).

3.30 p.m.: 'Strength Studies of Timber in the Development of Structural Grades' (Forest Products Laboratory, U.S.A.).

Advance copies of each paper will be obtainable (price 1s. 6d. per copy) from the Secretary of the Incorporated Association of Architects and Surveyors, 75, Eaton Place, London, S.W.1, who would be glad to know of any members of the Institution of Gas Engineers who intend to be present.

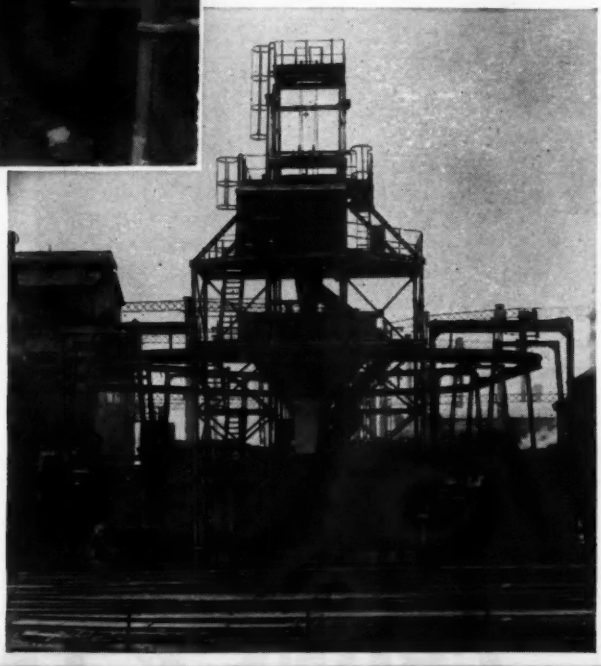
RAMS Golf Society.—Members of R. & A. Main, Ltd., entertained their guests at the Royal Mid-Surrey Golf Club on July 10. Twenty players took part. The weather was kind and the course caused difficulty to many. The results of the Medal round were:—(1) F. J. Walter 69, (2) L. A. W. Barnes (RAMS) 71, (3) Dr W. F. Coxon (Gas Times) 72. Lowest gross score, W. W. Paterson, 82.

COKE HANDLING AND GRADING PLANT



COMPLETE coke handling and grading plant for the Northern Gas Board, comprising Skip Hoist, Storage Bunkers, Screens and complete supporting structure, dealing with 20 tons per hour. The Skip Hoist is of the unbalanced semi-automatic type with 18 cwt. capacity, lifting speed 80 ft. per min.

Vibratory Screens include primary screen grading coke 1½ in. and under and a secondary screen grading 1½ in.-⅜ in. size and ⅜ in. and under. Bunkers include one 9½ tons capacity with chute loading direct to rail wagons, and two bunkers each 8 tons capacity with chutes for road wagon loading. All Bunkers are Gunite lined. The plant is complete with all electrical equipment and motors. Total height of structure 81 ft. above ground level.



OXLEY

ENGINEERING CO. LTD.

Telephone : Leeds 32521.
Telegrams : Oxbros, Leeds 10.

OXLEY ENGINEERING CO. LTD., HUNSLET, LEEDS 10

London Office: WINCHESTER HOUSE, OLD BROAD STREET E.C.2. Telephone : LONdon Wall 3731 Telegrams: Asbengpro, Stock, London W 139

ONE MAN AND HIS STACKER...

he loads with it

1

Tows it

2

Unloads with it

3

It is amazing what one man can do when he has a C. & T. Light Mobile Stacker to help him. The photographs show one of these versatile, roadworthy machines loading waste firebricks into a lorry (photo 1), then being towed to a railway siding (photo 2) to discharge the bricks into a railway wagon (photo 3). The entire job is carried out quickly and simply—a much more efficient method than laboriously throwing the bricks into the vehicles. (Photographs by courtesy of Thomas Mouget and Co. Ltd., Contractors, Middlesbrough.)

The C. & T. Light Mobile Stacker is available in four sizes with maximum delivery heights between 10 ft. 8 in. and 18 ft. At minimum elevation the exceptionally low overall height allows easy access to all parts for maintenance. Drive is electric, diesel or petrol.

Stacking coal in a cellar within 2 ft. of the ceiling . . . a faster, less costly method than barrowing and shovelling as done previously. (Photograph by courtesy of Jowett Cars Ltd., Bradford)

For complete details please write for leaflet CT2

CRONE & TAYLOR LTD.

SUTTON OAK · ST. HELENS · LANCS

CT 3242 Telephone: St. Helens 3397

Photograph of the 'Mushroom' caused by the Atom Bomb explosion at Bikini, 1949.

Foochow PROTECTIVE PAINTS WILL WITHSTAND *Corrosion*

FOOCHOW CHROMATE RED LEAD PAINT:
The standard primer for all steel and iron work. Brushes easily; gets right down into the pores of the metal; excellent storage properties; most economical in use.

FOOCHOW BLUE LEAD PAINT:
The ideal undercoat, or intermediate coat, between priming and finishing paints; exceptional spreading power and obliterations; highly inhibitive to corrosion; particularly recommended for crowns because of its extreme elasticity.

FOOCHOW MIKALOR PAINT:
Withstands conditions of utmost severity in the gas and coking industries; undoubtedly the lowest cost per year of protection.

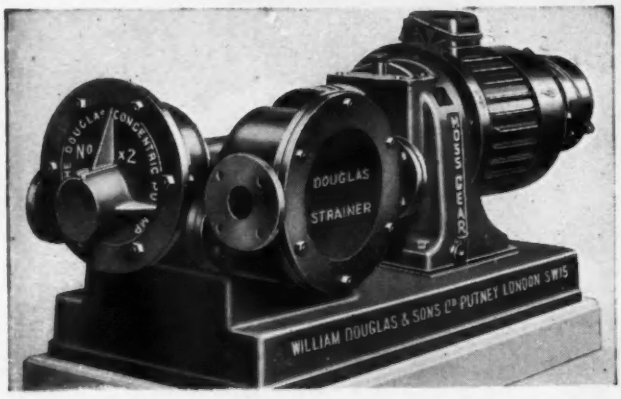
PERMANENT GASWORKS GREENS:
In three standard shades specially chosen for their proved reliability; fast to gasworks conditions, sunlight and sea air; do not disturb the amenities of seaside or inland resorts.

TO SOLVE YOUR PAINTING PROBLEMS—is our mission in life—let us help you to deal with them.

Send for Paint Samples and further particulars:–

DONALD MACPHERSON & Co., Ltd.
Gas Industries Division
21 ALBION STREET, MANCHESTER, 1.
Telephone: Central 5441/4
LONDON:
CHURCH ROAD, MITCHAM, SURREY.
Telephone: Mitcham, 2963/4

Foochow
ANTI-CORROSIVE PAINTS & ENAMELS
SCIENTIFICALLY FORMULATED FOR THE GAS INDUSTRY
PFI7



"THE DOUGLAS PUMP"

SHEWN FITTED WITH SUCTION PIPE LINE STRAINER, GIVING CHOICE OF TWO SUCTION LINES, PUMP & STRAINER STEAM HEATED. GOOD SUCTION. SLOW SPEED.

WILLIAM DOUGLAS & SONS LTD.,
PUTNEY - - LONDON, S.W.15.

Plenty to Spare...

During the past few months, considerable re-organisation of our works has taken place: production is planned on an entirely new basis, with the result that output is increasing. This is particularly so with fittings, and deliveries can be made from stock as shown.

Your orders will be dealt with promptly and efficiently.

MAKING-UP PIECES available in the following sizes, black or galvanised, ⅛in., ¼in., ⅜in., ½in., ¾in., 1in., 1¼in., 1½in., 2in., 2½in., 3in. and 4in.

RUSSELL BROS (WALSALL) LIMITED
BRADFORD TUBE WORKS · WALSALL

AH! THAT REMINDS ME

There is nothing experimental about "POP" Riveting—the modern single-sided riveting method.

One operator completes an entire riveting operation and sets "POP" rivets in places almost inaccessible by other methods.

There are countless applications.

Let us advise how "POP" rivets can help on your joining problems.

"POP" riveting is the modern system of riveting where the weakness of the human element is entirely eliminated during the actual riveting operation.

ONE OPERATOR OPERATION

"POP" is a Registered Trade Mark of the manufacturers

Geo. TUCKER EYELET Co. Ltd.
Walsall Road - - BIRMINGHAM, 22

CONSULTANTS AND TOOL MANUFACTURERS: **AIRCRAFT MATERIALS LTD.** MIDLAND ROAD, LONDON, N.W.1

THE MODERN SYSTEM OF RIVETING

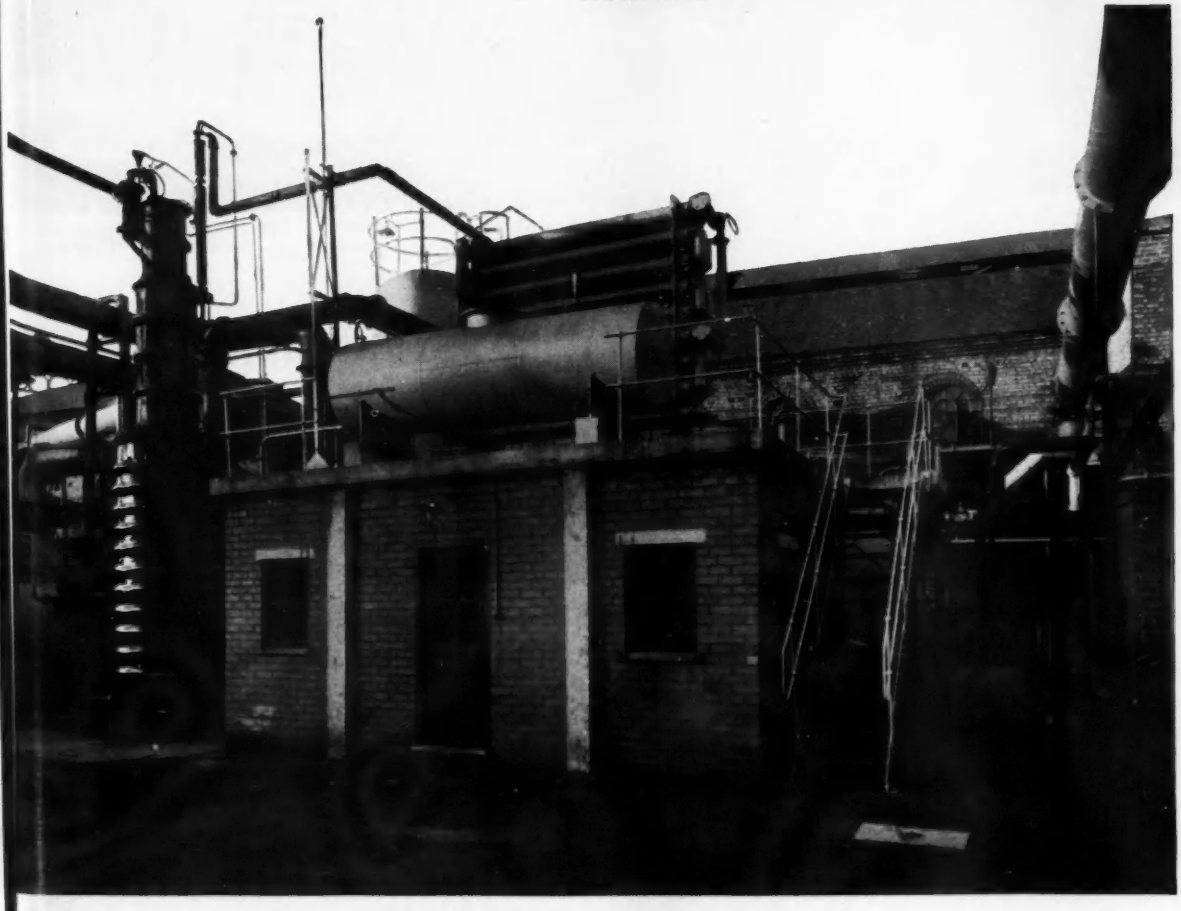
HOLDENS

Wilton AMMONIA RECOVERY PLANTS

The photographs show a Wilton crude concentrated ammonia liquor plant built for the West Midlands Gas Board at Worcester. These plants are specially designed to allow of efficient operation at varying capacities up to the rated maximum, and to produce products of any strength from 18 to 25 per cent NH_3 by weight irrespective of crude liquor strength. When only free ammonia is recovered, operation is automatic without shift labour.

Complete plants can also be built for ammonia recovery as sulphate of ammonia.

Control room



AMMONIA RECOVERY PLANTS BY

Chemical Engineering Wiltons Ltd

SIMON ENGINEERING GROUP

HOLBROOK PARK, HORSHAM, SUSSEX

Telephone: Horsham 965. Telegrams: Evaporator, Phone, Horsham

C.W.9.

DOUGLAS builds *from first to last*

This photograph shows part of the impressive Administration Block comprising laboratory, staff canteens, locker rooms and medical wing, recently constructed for a major national industrial undertaking.

ROBERT M. DOUGLAS (CONTRACTORS) LTD.,
395, George Road, Birmingham, 23.
Bridge Road, Waunarlwydd, Swansea.
London Office: 47, Victoria St., S.W.1.
Architects: Sir Percy Thomas & Son

CIVIL ENGINEERING · BUILDING · SITE INVESTIGATION · EXCAVATIONS · FOUNDATIONS · REINFORCED AND PRESTRESSED CONCRETE · FACTORIES · ROADS · BRIDGES · PILING · SEWERAGE · RAILWAYS · WATERWAYS · TUNNELS

"Marshall" Gas Boosters guarantee the positive displacement of air or gas; oxygen, hydrogen and most commercially used gases can be handled with complete safety.
An important feature of these boosters is the special seals which ensure oil-free delivery.
Flows up to 3,500 cfm can be obtained at pressures up to 10 psi.
Also available: Industrial Blowers and Vacuum Pumps.

For further particulars apply to: Home Sales Department.

SIR GEORGE GODFREY & PARTNERS (INDUSTRIAL) LTD.

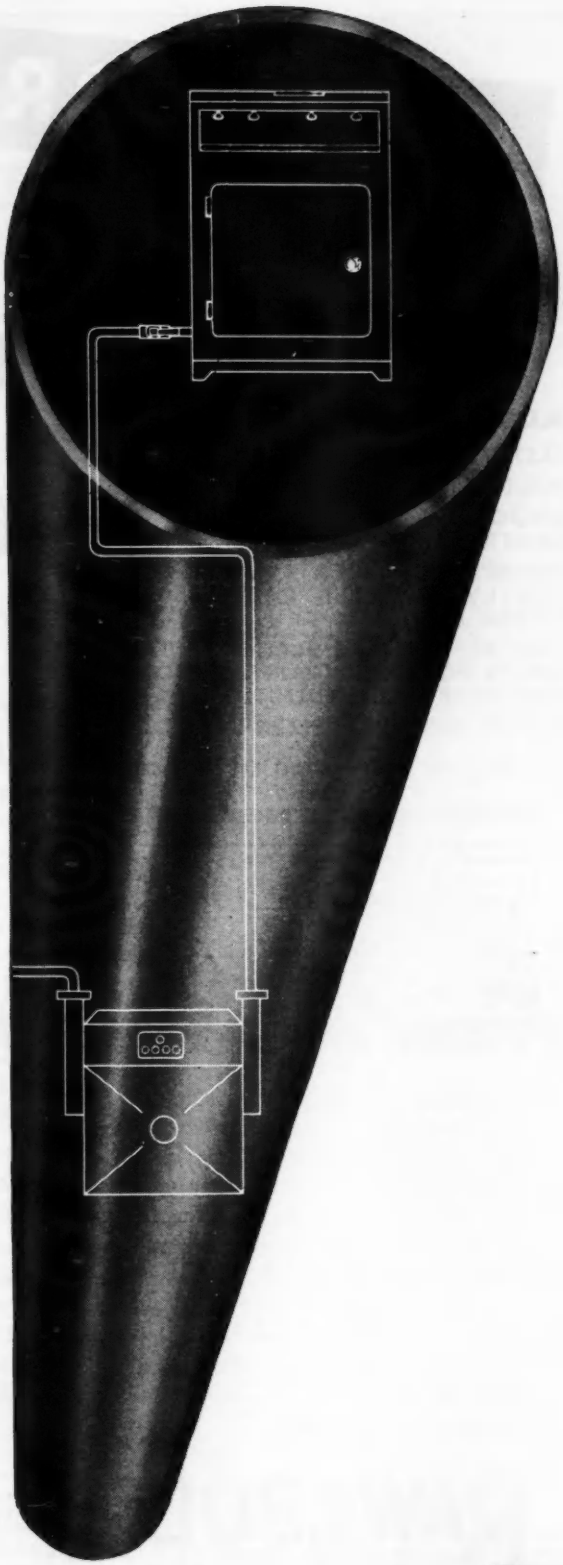
Telephone: FELTHAM 4037/8 • Cables: GODFREPART, LONDON
HANWORTH, MIDDLESEX

GODFREY
SIR GEORGE GODFREY & PARTNERS (IND) LTD.

Associated Companies in Canada, Australia, South Africa

Engineering Marine and Welding Exhibition and the Chemical Plant Exhibition, Olympia, London, September 3-17, 1953. Stand ·, Outer Row, Gallery, Grand Hall.

I.C.I. Copper tubes ensure trouble-free Gas Systems



For domestic gas systems, light gauge copper tubes made by the Metals Division of I.C.I. have five obvious advantages. They are:—

1 **Economical, both in laying costs and maintenance.**

2 **Not attacked by normal town gas.**

3 **Easily manipulated and installed.**

4 **Strong in relation to their light weight.**

5 **Neat in appearance.**

Whatever the building—farmhouse or factory; house, hotel or hospital—the job is better done with I.C.I. copper tubes.

IMPERIAL CHEMICAL INDUSTRIES LTD LONDON SW1

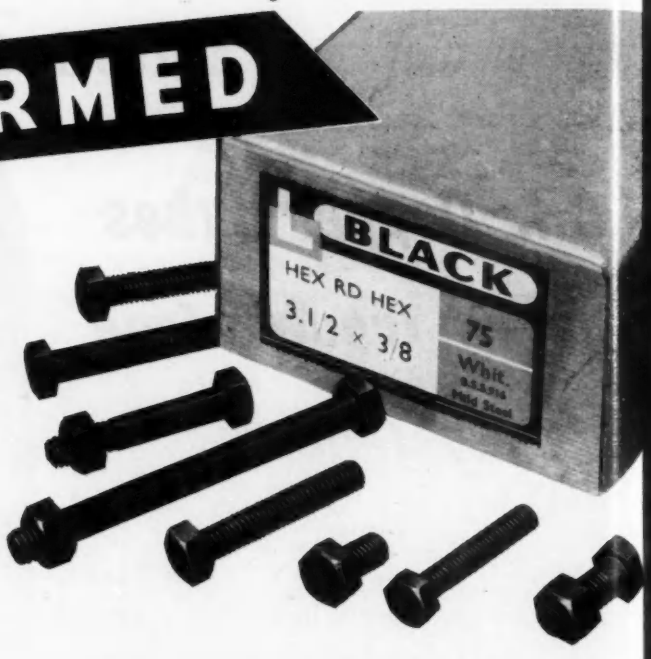
Fittings for copper tubes are made by Fyffe & Co. Ltd., Dundee, a subsidiary company of I.C.I.

ICI

M.304

COLD FORMED

You can now specify cold formed quality bolts and setscrews from ¼"—¾" diameter (inclusive) *without extra charge.*



ADVANTAGES

CLOSE TOLERANCES.

ROLLED THREADS ENSURE STRENGTH.

SMOOTH UNIFORM BLACK FINISH RESISTS RUST.

DIAMETERS UNDER ½" AVAILABLE IN NEATLY LABELLED CARTONS AT NO EXTRA COST.

CAN BE USED IN PLACE OF TURNED BOLTS FOR MANY APPLICATIONS AT CONSIDERABLE REDUCTION IN COST.

LARGE RANGE OF SIZES IN STOCK

*Other Departments—**Bright** and **Non-Ferrous***

THE LANARKSHIRE BOLT & RIVET CO. LTD.

BURNBANK LANARKSHIRE

Telephone HAMILTON 1241

THIS MACHINE—

4 BOLTS IN CONCRETE

Fixed in 38 minutes

Conditions were ideal, and ample power was available for drilling the concrete, *but even so it is only by Rawlplug methods such astonishing fixing speeds are possible.* Rawlbolts are a *dry* fixing, they grip at once by expansion—no grouting in, no waiting for cement to dry.

Even where speed is unimportant, it is still simple business efficiency to keep fixing times and costs to a minimum. Write for details of Rawlbolts (diameters up to 1") and the full range of Rawlplug tools.

If you have a fixing problem, please write us. Our Technical Service Dept. will be delighted to advise you free of cost or obligation.

RAWLBOLTS

B426

THE RAWLPLUG CO LTD • CROMWELL RD • LONDON • SW7

PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words)—minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep × 7" wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS OFFICE: 10, Union Street, Birmingham.

NORTHERN MANAGER: W. Q. Foster, 33, St. Helens Road, Harrogate. *'Phone:* Harrogate 84291.

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.

Telephone: CENtral 2236-7. *Telegrams:* Gasking, Fleet, London.

OXIDE

DUTCH AND DANISH BOG ORE
SPECIALLY ACTIVATED OXIDE OE IRON

Oxide supplied on loan or sale outright.
Highest prices paid for Spent Oxide.

Send your enquiries to

AS PURIFICATION & CHEMICAL COMPANY LIMITED

ESTABLISHED 1873

ALMERSTON HOUSE, OLD BROAD STREET, LONDON, E.C.2.

Telegrams: "Purification, Stock, London." Telephone: London Wall 5077

PRESSURE VESSELS
FOR THE GAS AND CHEMICAL INDUSTRIES

Welding in all Metals (Gas or Electric)

Welding Repairs

RICHMOND WELDING CO.
Richmond Road, BRADFORD
Tel. : BRADFORD 25405

FIRE! *QUICK!*
DEADLY SERIOUS BUT FOR
NU-SWIFT!

"The Police advised us to keep clear until the Fire Brigade arrived but, recharging Nu-Swift four times, I saved our home and business. 'What a wonderful job', said the Fire Brigade."

NU-SWIFT LTD · ELLAND · YORKS
In Every Ship of the Royal Navy

Offer Your
SCRAP GAS METERS
direct to the actual smelters
OAKLAND METAL Co. Ltd.
142 NEW BOND STREET, LONDON, W.1.
Phone: GROsvenor 5241-4
Works: Willington, Derby

KLEENOFF" *
THE COOKER CLEANER

KLEENOFF"
FIBRE BRUSHES
RUBBER MOPS

KAY-DEE" *
KETTLE DESCALER

Obtainable from stores to the public, and in bulk for Works use.

ALE & CHURCH, LTD.
CRAWLEY, SUSSEX.

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18–64 inclusive or a woman aged 18–59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

DRAUGHTSMAN required, used to constructional and plate work. Apply S. Cutler & Sons, Ltd., Providence Ironworks, Millwall, London, E.14.

METERS LIMITED require a **GENERAL SALES MANAGER.** One who has connections with the Gas Industry preferred but not essential. Prospects of early Directorship for suitable applicant.

Replies, which will be treated in strict confidence, stating age, experience and salary expected, without which no application will be considered, should be addressed to the Chairman, Meters Limited, 51, King Street, Manchester, 2, not later than July 31, 1953.

NORTHERN GAS BOARD

APPLICATIONS are invited for the post of SENIOR CHEMIST at the Howdon Works of the Newcastle Division.

Candidates should be suitably qualified to undertake full responsibility under the Works Manager, for supervision of chemical staff, and for all chemical testing and control of modern carbonising plant and ancillary equipment on a large works. Experience upon Intermittent Vertical Chambers an advantage.

Salary—A.P.T. IX, commencing at a figure commensurate with qualifications and experience.

The successful candidate will be required to pass a medical examination and subscribe to the Board's Superannuation Scheme.

Applications, stating age and full particulars to be addressed to the undersigned within fourteen days.

JOSEPH E. WHITE,
Divisional General Manager.

30, Grainger Street,
Newcastle-upon-Tyne, 1.

SOUTH EASTERN GAS BOARD

ASSISTANT ENGINEER—
CARBONISING,
BRIGHTON WORKS,
SUSSEX DIVISION

APPLICATIONS for this position are invited from persons with experience in the operation of Continuous Vertical Retorts and who possess the Higher Grade Certificate in Gas Engineering (Manufacture) of the Institution of Gas Engineers.

The successful applicant will be responsible to the Engineer, Brighton, for the technical and labour control of gasmaking plant which will include a new installation of Continuous Vertical Retorts with a total capacity of 15 million cu. ft./day now under construction, C.W. gas plant and, for a limited period, a horizontal retort house with a capacity of 4 million cu. ft./day.

Commencing salary will be not less than £815 per annum.

Applications in writing and quoting reference V10/324, giving full details should reach the undersigned not later than fourteen days after the publication of this notice.

R. J. MCCRAE,
Personnel Manager.

Katharine Street,
Croydon.

NORTH WESTERN GAS BOARD

APPLICATIONS are invited from suitably qualified persons for the following pensionable appointments :—

1. ASSISTANT DEMONSTRATORS at the PRESTON and STRETFORD Training Centres, who will assist in the teaching of gas fitting practice. The salary will be within Grades A.P.T. VI-VII (£490-£625 per annum).
2. DEMONSTRATOR at the PRESTON Training Centre to be responsible for the teaching of gas fitting practice. The salary will be within Grades A.P.T. VII-VIII (£545–£665 per annum).
3. INSTRUCTORS at the PRESTON and STRETFORD Training Centres and within the MID-CHESHIRE Group at a salary within Grades A.P.T. VIII-IX (£585-£715 per annum). Instructors will be required to teach both the theory and practice of gas fitting.

Applicants for any of the above positions must possess the Final City and Guilds Certificate in Gas Fitting and should have had recent Gas Fitting experience on the district : preference will be given to applicants for positions as Instructors who, in addition, possess a Certificate in Gas Engineering (Supply).

Detailed applications, giving the names of two referees should reach the Secretary, North Western Gas Board, 60, Whitworth Street, Manchester, 1, within fourteen days.

(Classified advertisements continued on page 182)

APPOINTMENTS VACANT (*ctd.*)

SENIOR DRAUGHTSMAN required by large Company in South Yorkshire. Experienced in the design of purification and storage plant for the Gas Industry. Alternatively, having knowledge of steel and cast iron tanks, and structural work. Permanent situation with excellent prospects of advancement for first-class man. Superannuation scheme and other advantages. State full details and salary required to: No. 156, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION

DIVISIONAL SALES AND SERVICE MANAGER

APPLICATIONS are invited from suitably qualified persons for the position of DIVISIONAL SALES AND SERVICE MANAGER.

The commencing salary will be not less than £1,000 per annum.

The successful applicant will be responsible to the Divisional General Manager for the co-ordination and development of the Sales and Service activities throughout the Division.

Applicants should have had a wide experience in all branches of the Sales and Service Departments of Gas Undertakings, and be thoroughly conversant with modern Gasfitting practices and Sales methods.

The successful candidate may be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required if eligible to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications with full details of age, qualifications, education and experience, together with the names of two referees, should be addressed to the undersigned to be received not later than Monday, July 27, 1953.

A. GWYNNE DAVIES,
Secretary.

Beverley House,
University Road,
Leicester.
July 9, 1953.

SCOTTISH GAS BOARD

KILMARNOCK GROUP

GROUP DISTRIBUTION SUPERINTENDENT

APPLICATIONS are invited for the position of GROUP DISTRIBUTION SUPERINTENDENT for the Kilmarnock Group.

The salary will be within A.P.T. Grade IX, Provincial 'A', £615 to £715 per annum, with placing according to qualifications and experience.

If essential, housing accommodation will be made available.

Applicants should possess the Higher Grade Certificate (Supply) of the Institution of Gas Engineers, or an equivalent qualification. Applicants should be experienced in all branches of gas utilisation and transmission at both low and high pressures. Sound training and experience in the planning, estimating and supervision of distribution systems is essential.

The post is superannuable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to the undersigned within fourteen days from the appearance of this advertisement.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.
July, 1953.

SCOTTISH GAS BOARD

FIFE GROUP

BUCKHAVEN & LEVEN DISTRICT

APPLICATIONS are invited for the position of DISTRICT MANAGER for the above District and any extension thereof.

Applicants should be Corporate Members of the Institution of Gas Engineers, should have wide experience in the control, operation and administration of a medium-sized Gas Works.

The salary will be on a Scale £925-£1,125 per annum, with annual increments of £40 and placing will be according to qualifications and experience. A house, for which rent will be charged, will be available.

The successful applicant will require to pass a medical examination and will be required to join the Board's Pension Scheme.

Applications, endorsed "District Manager—Buckhaven and Leven" stating age, training, qualifications and experience, together with the names of two referees, should reach the undersigned on or before Saturday, July 24, 1953.

D. L. DICKSON,
Group Manager.

Gas Works,
Grange Road,
Dunfermline.

SCOTTISH GAS BOARD

LANARKSHIRE DIVISION

APPLICATIONS are invited from suitably qualified persons for the undernoted appointments:—

DIVISIONAL TECHNICAL ASSISTANT—
UDDINGSTON

Applicants should have sound practical experience in the operating of Continuous Vertical Retorts, C.W.G. Manufacture, and be capable of carrying out efficiency tests on all standard units of Gas Works Plant.

The salary will be in accordance with Grade IX, Provincial 'A', of the National Salary Scales for Gas Staffs (£615-£715 × £20 per annum) with placing according to experience and qualifications.

SENIOR TECHNICAL ASSISTANT—
HAMILTON DISTRICT

Applicants should have sound practical experience in the operation of Continuous Vertical Retorts, and be familiar with the technical control of a modern Gas Undertaking.

The salary will be in accordance with Grade VI, Provincial 'A', of the National Salary Scales for Gas Staffs (£490-£570 × £20 per annum) with placing according to experience and qualifications.

DISTRIBUTION SUPERINTENDENT—
MOTHERWELL & WISHAW DISTRICT

Applicants should have sound practical experience on all sections of a Distribution Department of a *Medium Sized Undertaking* and an intimate knowledge of High and Low Pressure Distribution and the Marketing of Domestic and Industrial Appliances. The salary will be in accordance with Grade VIII, Provincial 'A', of the National Salary Scales for Gas Staffs (£585-£665 × £20 per annum) with placing according to experience and qualifications.

The successful candidates for the above appointments may require to pass a Medical Examination and shall require to subscribe to the Board's Superannuation Scheme.

Applications addressed to the undersigned and suitably endorsed, should be delivered to the address given below not later than Monday, July 27, 1953.

JAMES M. DOW,
Divisional Controller.

Divisional Headquarters,
Bothwell Road,
Uddingston.
Lanarkshire.
July 3 1953.

PATENTS

KINGS PATENT AGENCY, LTD.
(Director, B. T. King, A.I.Pl.E., Patent Agent.) Advice, Handbook, and Consultations free. 146a, Queen Victoria Street, London, E.C.4. 'Phone: City 6[illegible].

PUBLICATIONS

GAS ACCOUNT CALCULATORS

SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 354, WHEELER STREET, BIRMINGHAM.

'Phone: Northern 0989. 'Grams: Reckoners, B'ham.

MISCELLANEOUS

THE REPLY IS IN THE NEGATIVE

THESE DAYS, a sound investment is something to write home about. What we write of here is not a new discovery, for it has long been at the disposal of industry. The point is that only the alert are using it to their full advantage. We refer to the help afforded to administration by a FULL PHOTOGRAPHIC RECORD of constructional jobs from foundation to completed building, from rough casting to finished product. Nothing escapes the eye of the camera. No other recorder covers such a wide field. A progressive file of photographs taken at regular, specified intervals, is an ever-present aid to the busy executive. It can be referred to at once in case of any point which may arise during the construction of plant or the making of a product. It shows progress at a glance unmistakably and eliminates the cause of wrangling and argument.

Walter King Photographs are specially staffed and equipped for this type of work and are prepared to tour the Midlands, Southern Counties, and Home Counties.

Details of this photographic service on request to Walter King, Ltd., 11, Bolt Court, Fleet Street, London, E.C.4.

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.

NATURAL BRITISH.

BOG (DUTCH and DANISH) ORE.

SPENT OXIDE.

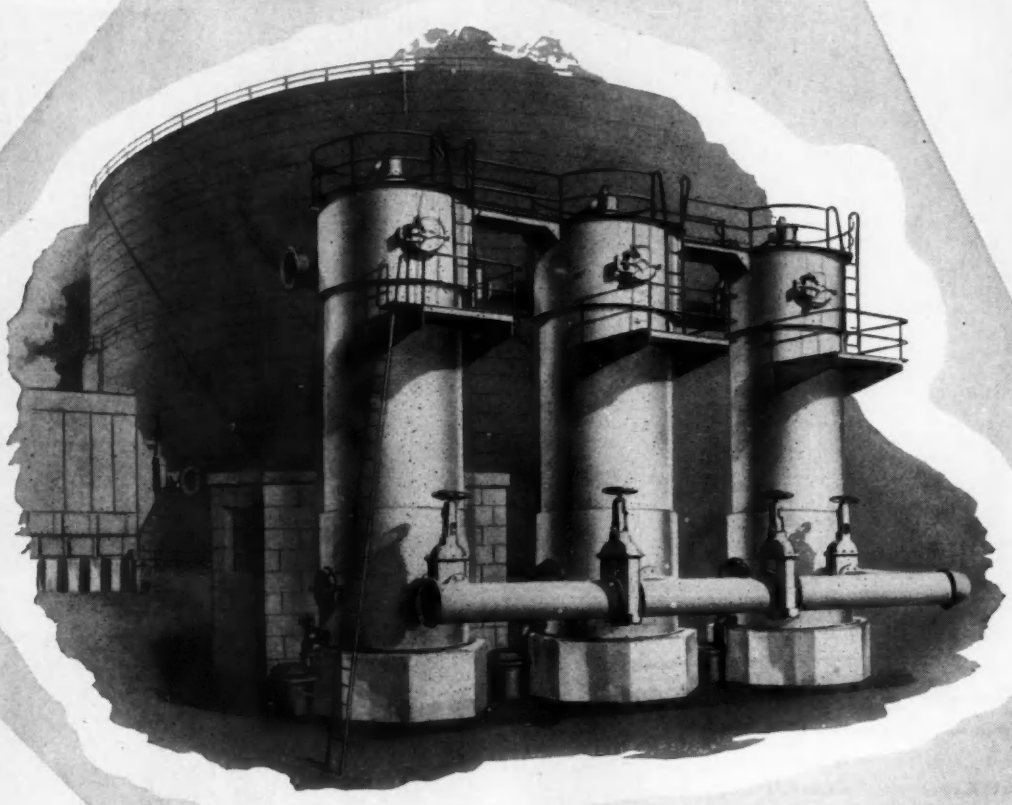
LONDON ROAD, LEICESTER.

Telegrams: "BRIPURIMAT"
Telephone: 59086

STRINGER BROTHERS
ALBION WEST BROMWICH

S.B
IRON & STEEL
PLATES & SHEETS
BARS & SECTIONS
Telephone:
WEST BROMWICH 0430-7

TAR EXTRACTION . .



. . more efficiently by

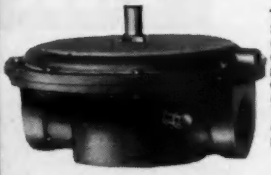
HOLMES ELEX

W. C. HOLMES & CO. LTD. HUDDERSFIELD
LONDON BIRMINGHAM

1650-2

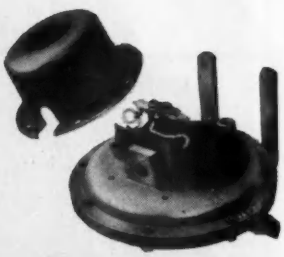
controlling gas supplies

FOR CONTROLLING THE QUALITY OF AIR/GAS MIXTURE *irrespective of varying pressures and resistances. Temperature control is varied by manipulation of the air cock only.*
CAPACITY RANGE: *from 130 to 1,380 cub. ft. of gas per hour according to air pressure (¼ lb. to 1 lb.) and size. For low pressure gas systems.*
AIR INLETS: 1", 1¼", 1½" *and* 2" *dias. gas thread.*



THE SINGLE DIAPHRAGM AUTOMATIC SHUT-OFF VALVE *(illustrated left) automatically closes the gas supply in the event of pressure dropping below a predetermined point. Not until all burner cocks on the outlet have been shut and gas pressure restored is it possible to re-open the valve. This appliance is for operation on systems handling 150 to 2,400 cub. ft. of low pressure gas per hour.*

THE AUTOMATIC CUT-OFF SWITCH, *illustrated right, automatically breaks the electric supply to motor-driven gas boosters or compressors if low pressure gas falls below a predetermined pressure.*
RANGE: *Type 1 operates between .2" and 1.2" w.g. pressure.*
Type 2 operates between 1.2" and 5" w.g. pressure.
Type 3 operates between 5" and 15" w.g. pressure.
Additional applications include its use as (a) an air flow switch in conjunction with a flame failure device and (b) a gas meter protector.



INDUSTRIAL GAS EQUIPMENT

Keith Blackman LIMITED

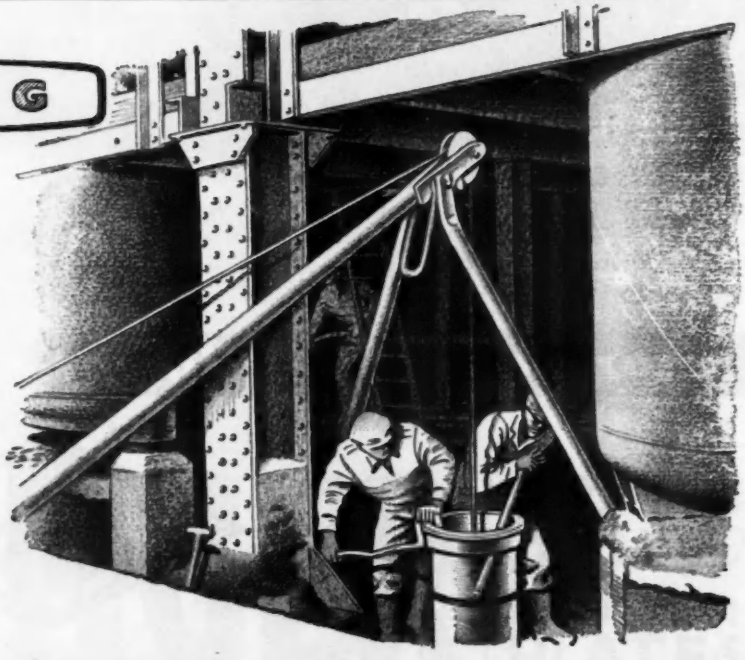
MILL MEAD ROAD, TOTTENHAM, LONDON, N.17
Phone: Tottenham 4522 (twelve lines) Grams: "Keithbla, Norphone, London"
BRANCH OFFICES: AT MANCHESTER, BIRMINGHAM, LEEDS, GLASGOW, NEWCASTLE-ON-TYNE, PENARTH (near CARDIFF), AND BELFAST

522

PILING

The Cementation Company, Ltd., have the resources and the experience to undertake piling work for Hammer Foundations, Factory Extensions, Machinery Bases, Underpinning, Bridges and any similar purpose in any part of the world.

—And the skill to complete the work quickly and inexpensively even where headroom and working space are limited and freedom from harmful vibration is essential.



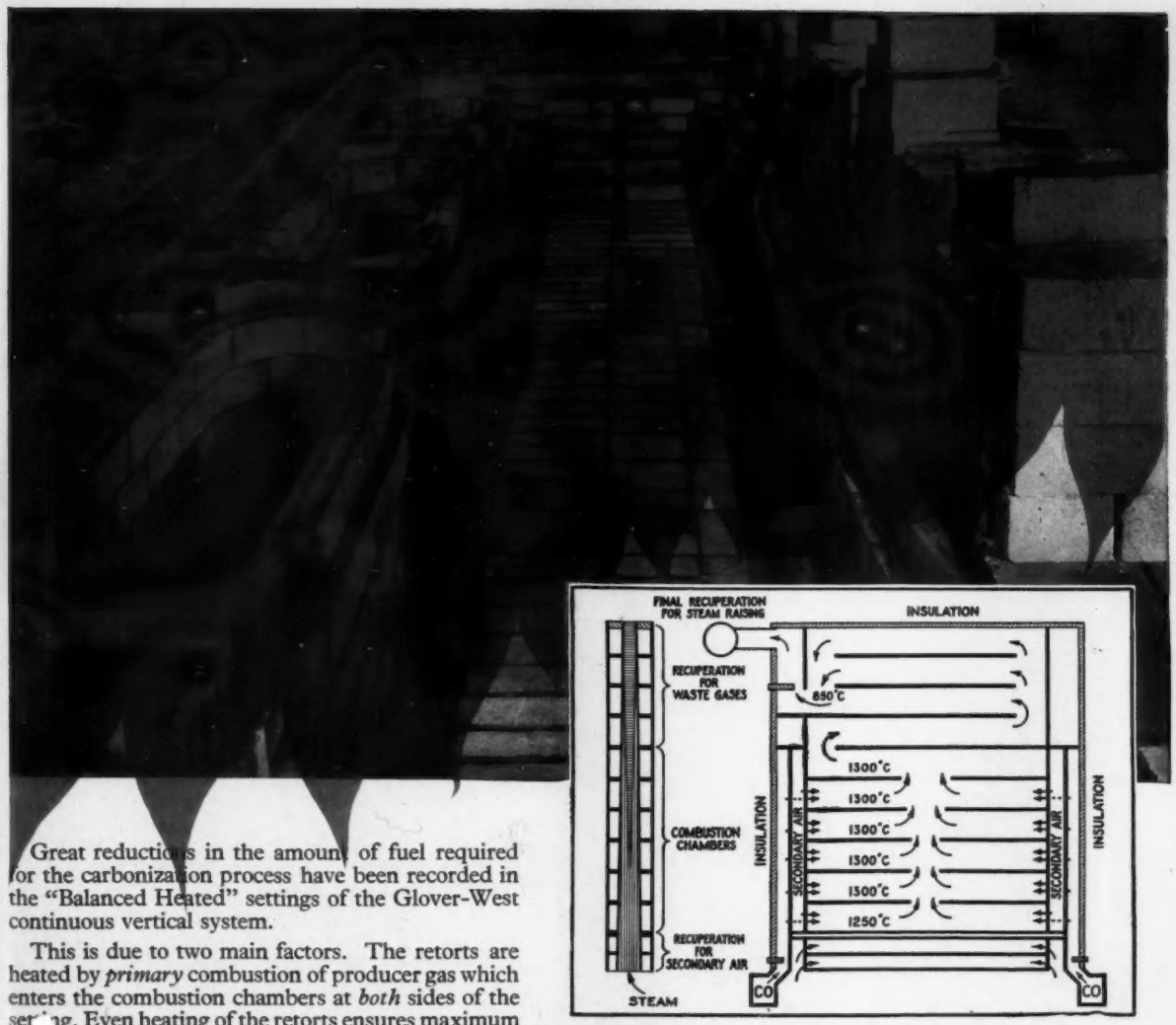
BY THE **CEMENTATION** *Company Limited*

BENTLEY WORKS · DONCASTER · Tel. DON. 54177-8-9

Registered as a Newspaper. Printed by STRAKER BROTHERS LTD., E.C.2, for WALTER KING, LIMITED, 11, BOLT COURT, FLEET ST., LONDON, E.C.4. Wednesday, July 15, 1953

"Balanced Heating"

MEANS ECONOMICAL GAS—MAKING



Great reductions in the amount of fuel required for the carbonization process have been recorded in the "Balanced Heated" settings of the Glover-West continuous vertical system.

This is due to two main factors. The retorts are heated by *primary* combustion of producer gas which enters the combustion chambers at *both* sides of the setting. Even heating of the retorts ensures maximum utilization of heat and eliminates high local temperatures and fuel wastage.

In addition, improved control of individual combustion chamber temperatures ensures maximum gas production from all coals.

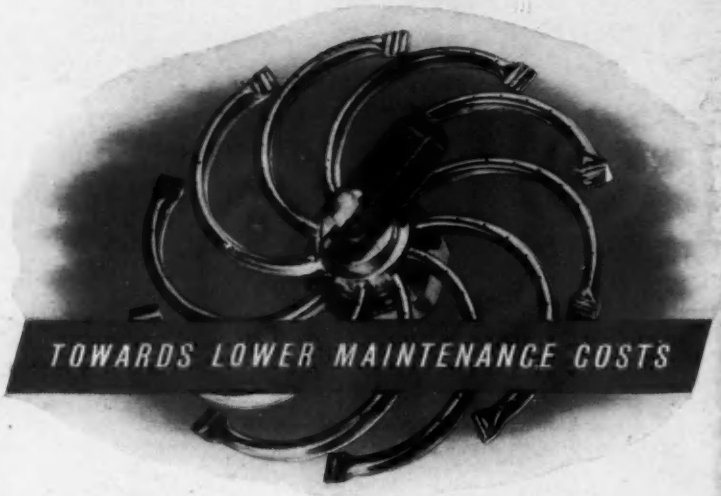
* *Illustration shows a "Balanced Heated" setting under construction.*

West's Gas IMPROVEMENT CO. LTD.

ALBION IRONWORKS · MILES PLATTING · MANCHESTER 10

Telephone: COLlyhurst 2961. Telegrams: Stoker, Manchester.

London Office: Columbia House, Aldwych, W.C.2. Phone: HOLborn 4108-9 Grams: Wesgasco, Estrand.



Now-stainless steel rosette burner fitted to all 503 series Ascot water heaters

OUTSTANDING ADVANTAGES:—

1 Stainless steel being highly resistant to corrosion and damage, burner maintains maximum performance throughout its long life.

2 Blockage due to corrosion is practically impossible, so burner maintenance is virtually eliminated.

3 Greater strength and rigidity of stainless steel compared with brass permits burner bars of smaller section.

4 Better aeration, because smaller bars allow freer flow of air, resulting in better combustion.

5 Two types of burner with different sized pin-holes. Standard—for calorific values 425 to 525; Special—for calorific values below 425.

6 Piercing instead of drilling produces cleaner and more accurate pin-holes, giving a better flame picture and permitting more positive regulation.

ASCOT

Only Ascots have stainless steel burners . . .
another reason for recommending Ascot!

ASCOT GAS WATER HEATERS LTD · 255 NORTH CIRCULAR ROAD · NEASDEN · LONDON · NW10
member of the PARNALL Group of Companies